

TEST REPORT

Application No.: SZCR2110023549AT
Applicant: Qorvo International Pte. Ltd.
Address of Applicant: 1 Changi Business Park Avenue 1, # 04-01, Singapore
Manufacturer: Qorvo International Pte. Ltd.
Address of Manufacturer: 1 Changi Business Park Avenue 1, # 04-01, Singapore
Factory: Victory Concept
Address of Factory: Building A, No 18 Shuiyuan Industrial District, Ruhu Town, Huizhou City, 516021, Guangdong

Equipment Under Test (EUT):
EUT Name: UWB Transceiver module
Model No.: DWM3001C
Trade Mark: Qorvo
Standard(s) : EN 302 065-1 V2.1.1
Date of Receipt: 2021-11-01
Date of Test: 2021-11-11 to 2021-11-19
Date of Issue: 2021-12-02

Test Result:

Pass*

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch EMC Laboratory

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-12-02		Original

Authorized for issue by:				
		Calvin Weng		
		Calvin Weng/Project Engineer		
		Eric Fu		
		Eric Fu/Reviewer		



2 Test Summary

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Operating Bandwidth	EN 302 065-1 V2.1.1	EN 303 883, clause 7.4.2	EN 302 065-1 Clause 4.3.1	Pass
Maximum Value of Mean Power Spectral Density		EN 303 883, clause 7.4.3	EN 302 065-1 Clause 4.3.2	Pass
Maximum value of peak power		EN 303 883, clause 7.4.4	EN 302 065-1 Clause 4.3.3	Pass
Other Emissions		EN 303 883, clause 7.4.3	EN 302 065-1 Clause 4.3.6	Pass
Receiver spurious emissions		EN 303 883, clause 7.4.5	EN 302 065-1 Clause 4.4.2	Pass
Receiver interference handling		TS 103 361 V1.1.1, clause 9.3	EN 302 065-1 Clause 4.4.3	Pass
Detect and Avoid		EN 303 883, clause 7.4.7	EN 302 065-1 Clause 4.5.1	N/A
Low Duty Cycle		EN 303 883, clause 7.4.8	EN 302 065-1 Clause 4.5.3	Pass

Remark: N/A=Not applicable.



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4 General Information

4.1 Details of E.U.T.

Power supply:	For RF Module: DC3.3V from debug board For Debug Board: DC5V from PC USB port
Frequency Range:	6489.6MHz;7987.2MHz
Modulation Type:	PM
Sample Type:	Hand Held Use
Antenna Type:	PCB Antenna
Antenna Gain:	0.3dBi for 6489.6MHz, 0.8dBi for 7987.2MHz
Channel Number:	2
Hardware Setup:	Using a terminal emulator the DWM3001 was configured to transmit on Channel 5 and 9 using a preamble length of 64, a 64M PRF with a data rate of 6.8 Mbps.

4.2 Environment Parameter

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	25	3.3
LTLV	0	2.4
LTHV	0	3.6
HTLV	45	2.4
HTHV	45	3.6

Note:

NV:Normal Voltage

LV:Low Extreme Test Voltage

HV:High Extreme Test Voltage

NT:Normal Temperature

LT:Low Extreme Test Temperature

HT:High Extreme Test Temperature

4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--
The EUT has been tested as an independent unit.			

4.4 Measurement Uncertainty

Test Item	Measurement Uncertainty
Operating Bandwidth	± 3%
Maximum Value of Mean Power Spectral Density	4.8dB
Maximum value of peak power	4.8dB
Other Emissions	4.8dB
Receiver spurious emissions	4.8dB



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4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI (Member No. 1937)**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



5 Equipment List

Operating Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2021-03-24	2022-03-23
Measurement Software	TST	TST PASS V1.1.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM028-05	2021-07-09	2022-07-08
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021-04-08	2022-04-07

Maximum Value of Mean Power Spectral Density					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2023-04-13
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2021-09-23	2022-09-22
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2021-07-09	2022-07-08

Maximum value of peak power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2023-04-13
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2021-09-23	2022-09-22
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2021-07-09	2022-07-08



Other Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2023-04-13
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2021-09-23	2022-09-22
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2021-07-09	2022-07-08

Receiver spurious emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2023-04-13
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2021-09-23	2022-09-22
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2021-07-09	2022-07-08

Receiver interference handling					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2021-03-24	2022-03-23
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2021-09-23	2022-09-22
Measurement Software	TST	TST PASS V1.1.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM028-05	2021-07-09	2022-07-08
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021-04-08	2022-04-07

Low Duty Cycle					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12



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DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2021-03-24	2022-03-23
Measurement Software	TST	TST PASS V1.1.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM028-05	2021-07-09	2022-07-08
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021-04-08	2022-04-07

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2021-09-14	2022-09-13
Humidity/ Temperature Indicator	Anymetre	TH101B	SEM002-09	2021-09-14	2022-09-13
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2021-03-30	2022-03-29



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6 Radio Spectrum Matter Test Results

6.1 Operating Bandwidth

Test Requirement EN 302 065-1 Clause 4.3.1

Test Method: EN 303 883, clause 7.4.2

Limit:

≥50MHz

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.8 °C

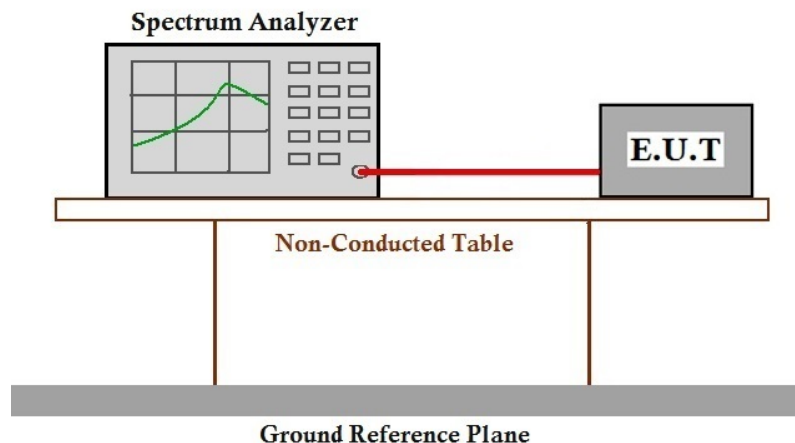
Humidity: 47.0 % RH

Atmospheric Pressure: 1020 mbar

6.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	Keep the EUT in continuous transmitting mode with modulation

6.1.3 Test Setup Diagram



6.1.4 Measurement Procedure and Data

1. use the recorded results of the TE and OE to specify the UE over the complete frequency range given in the relevant harmonised standard;
2. find the lowest frequency (fL) below the operating bandwidth at which UE decreases to the level -10dBc. This frequency shall be recorded;
3. find the highest frequency (fH) at which the UE decreases to the level -10dBc. This frequency shall be recorded;
4. find the frequency (fM) at which the highest emission level occurs, this frequency shall be recorded and used for the peak power measurement;
5. the difference between the lowest frequency (fL) and highest frequency (fH) is the operating bandwidth (OBW) which shall be recorded:

$$OBW = fH - fL$$

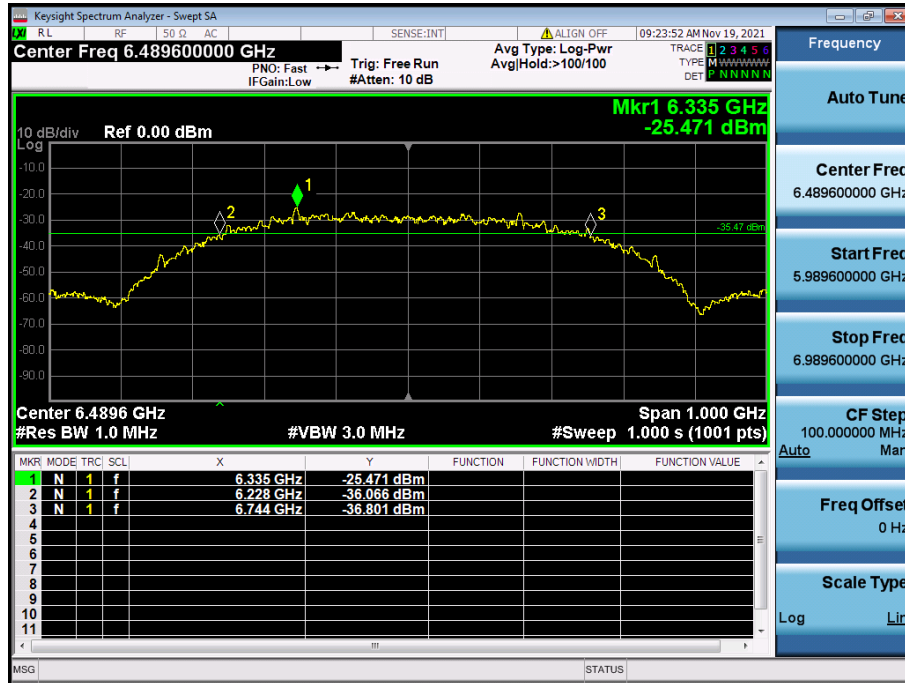
6. the addition of the lowest frequency and highest frequency divided by two is the centre frequency (FC) which shall be recorded:

$$FC = (fL + fH)/2$$

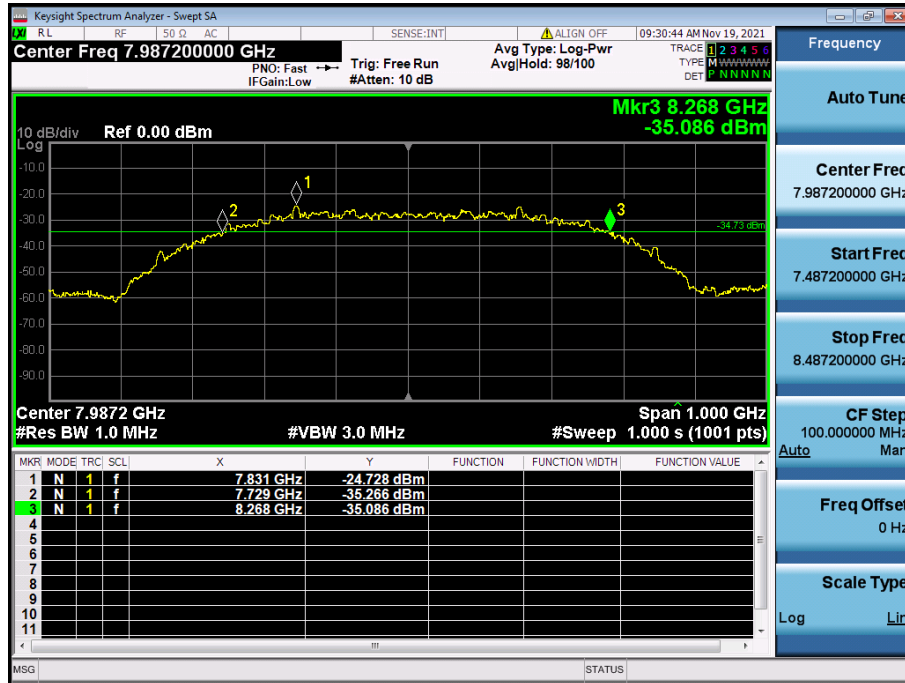
NOTE: This evaluation steps are to be repeated for each operating bandwidth as declared by the manufacturer.



F _c (GHz)	F _M (GHz)	F _L (GHz)	F _H (GHz)	-10dBc Bandwidth(MHz)	Limit(MHz)
6.486	6.335	6.228	6.744	516	≥50



F _c (GHz)	F _M (GHz)	F _L (GHz)	F _H (GHz)	-10dBc Bandwidth(MHz)	Limit(MHz)
7.9985	7.831	7.729	8.268	539	≥50



6.2 Maximum Value of Mean Power Spectral Density

Test Requirement EN 302 065-1 Clause 4.3.2

Test Method: EN 303 883, clause 7.4.3

Measurement Distance: 3m

Limit:

Frequency range [GHz]	Without mitigation techniques	With mitigation techniques
$f \leq 1,6$	-90 dBm/MHz	-90 dBm/MHz
$1,6 < f \leq 2,7$	-85 dBm/MHz	-85 dBm/MHz
$2,7 < f \leq 3,1$	-70 dBm/MHz	-70 dBm/MHz
$3,1 < f \leq 3,4$	-70 dBm/MHz	-41,3 dBm/MHz (notes 1 and 2)
$3,4 < f \leq 3,8$	-80 dBm/MHz	-41,3 dBm/MHz (notes 1 and 2)
$3,8 < f \leq 4,8$	-70 dBm/MHz	-41,3 dBm/MHz (notes 1 and 2)
$4,8 < f \leq 6$	-70 dBm/MHz	-70 dBm/MHz
$6 < f \leq 8,5$	-41,3 dBm/MHz	-41,3 dBm/MHz
$8,5 < f \leq 9$	-65 dBm/MHz	-41,3 dBm/MHz (note 2)
$9 < f \leq 10,6$	-65 dBm/MHz	-65 dBm/MHz
$10,6 < f$	-85 dBm/MHz	-85 dBm/MHz

NOTE 1: Within the band 3,1 GHz to 4,8 GHz, devices implementing **Low Duty Cycle (LDC) mitigation technique** (see clause 4.5.3) are permitted to operate with a maximum mean e.i.r.p. spectral density of -41,3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz.

NOTE 2: Within the bands 3,1 GHz to 4,8 GHz and 8,5 GHz to 9 GHz, devices implementing **Detect And Avoid (DAA) mitigation technique** (see clause 4.5.1) are permitted to operate with a maximum mean e.i.r.p. spectral density of -41,3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz.

6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C

Humidity: 56.3 % RH

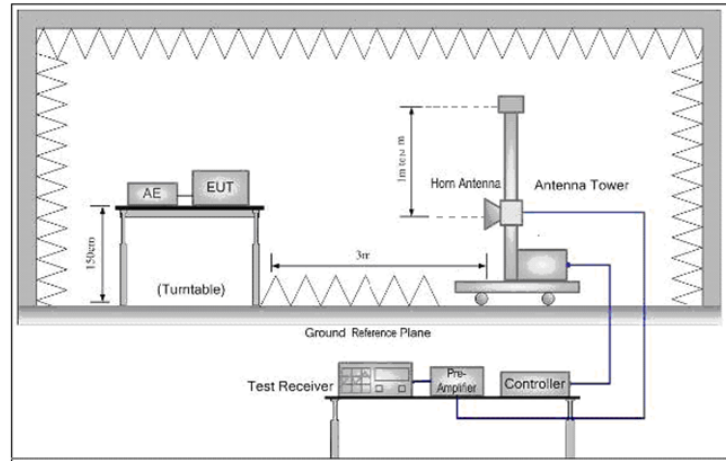
Atmospheric Pressure: 1020 mbar

6.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	Keep the EUT in continuous transmitting mode with modulation



6.2.3 Test Setup Diagram



6.2.4 Measurement Procedure and Data

The following shall be applied to the combination(s) of the radio device and its intended antenna(s). In the case that the RF power level is user adjustable, all measurements shall be made with the highest power level available to the user for that combination.

Measurements shall be carried out over the frequency ranges as shown in the relevant harmonized standards.

When measuring maximum mean power spectral density from the radio device under test, the spectrum analyser or equivalent shall be configured as follows unless otherwise stated:

Resolution bandwidth: 1 MHz

Video bandwidth: Not less than the resolution bandwidth.

Detector mode: RMS (power average).

Display Mode: max. hold.

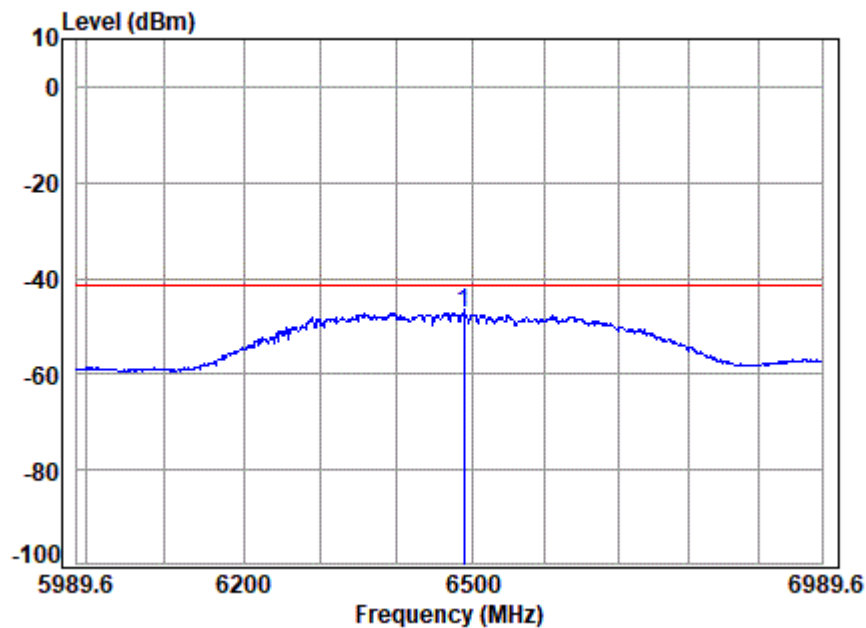
Average time 1 ms or less (per sweep point on spectrum analyser scan).

NOTE: "average time" may not be an explicit setting. In some cases it may be determined by setting the number of measurement points and the time taken for a sweep.

Frequency Span: Equal to or less than the number of sweep points multiplied by the resolution bandwidth, preferably less than half as much.

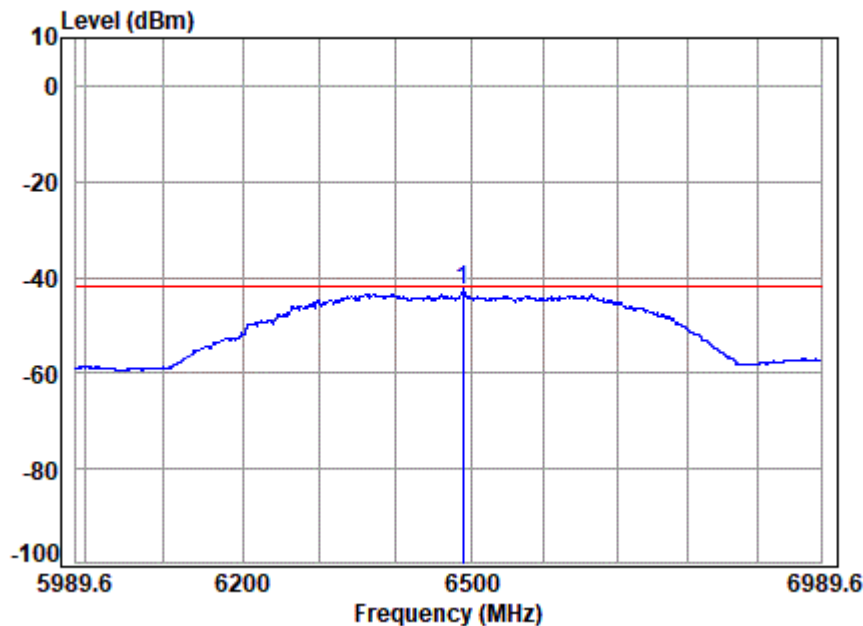
The measurement results shall be determined and recorded over the specified frequency ranges given in the relevant harmonized standards.





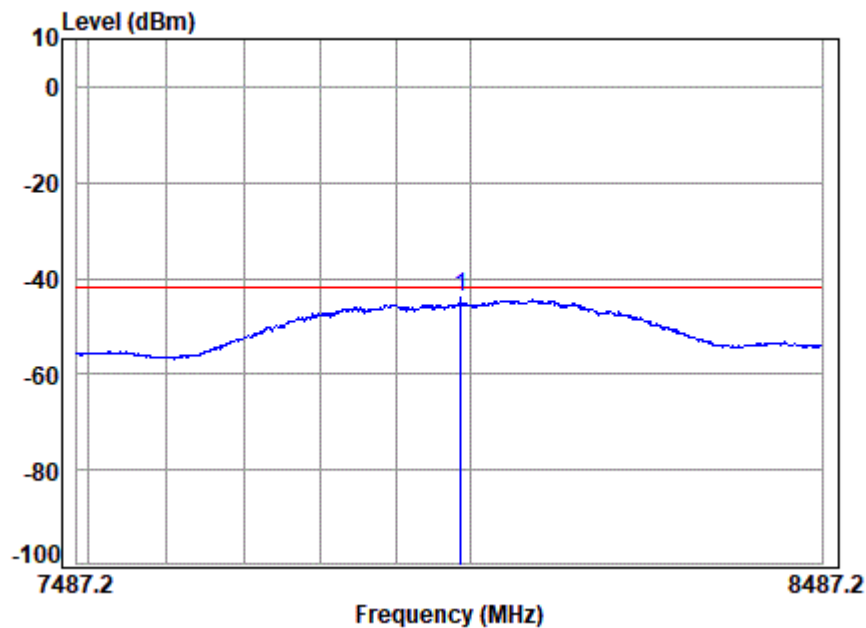
Test Frequency (MHz)	Mean power spectral density (dBm/MHz)	Limit (dBm/MHz)	Over Limit (dBm/MHz)	Polarization	Result
6489.6	-46.16	-41.30	-4.86	Horizontal	Pass





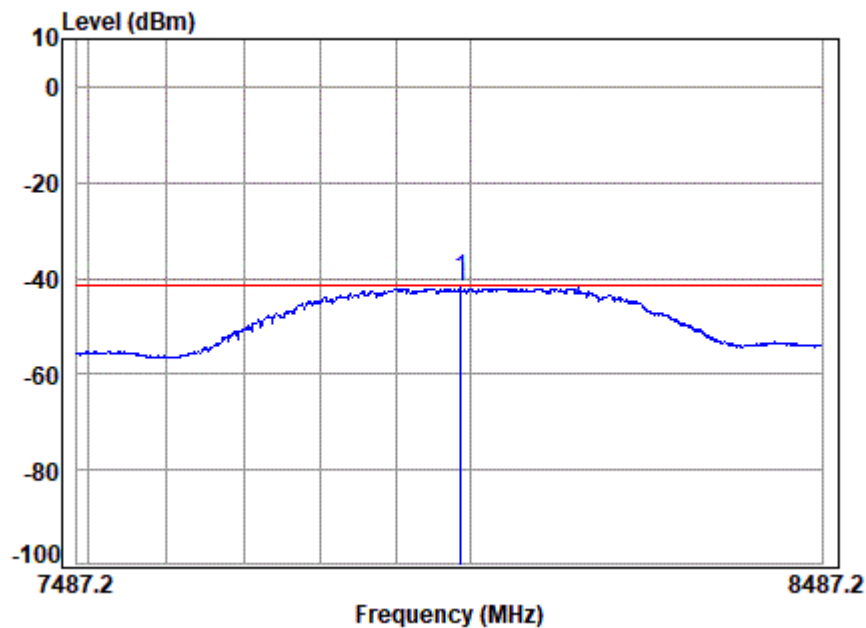
Test Frequency (MHz)	Mean power spectral density (dBm/MHz)	Limit (dBm/MHz)	Over Limit (dBm/MHz)	Polarization	Result
6489.6	-41.43	-41.30	-0.13	Vertical	Pass





Test Frequency (MHz)	Mean power spectral density (dBm/MHz)	Limit (dBm/MHz)	Over Limit (dBm/MHz)	Polarization	Result
7987.2	-44.13	-41.30	-2.83	Horizontal	Pass





Test Frequency (MHz)	Mean power spectral density (dBm/MHz)	Limit (dBm/MHz)	Over Limit (dBm/MHz)	Polarization	Result
7987.2	-41.46	-41.30	-0.16	Vertical	Pass



6.3 Maximum value of peak power

Test Requirement EN 302 065-1 Clause 4.3.3

Test Method: EN 303 883, clause 7.4.4

Measurement Distance: 3m

Limit:

Frequency range [GHz]	Without mitigation techniques (defined in 50 MHz)	With mitigation techniques (defined in 50 MHz)
$f \leq 1,6$	-50 dBm	-50 dBm
$1,6 < f \leq 2,7$	-45 dBm	-45 dBm
$2,7 < f \leq 3,1$	-36 dBm	-36 dBm
$3,1 < f \leq 3,4$	-36 dBm	0 dBm (notes 1 and 2)
$3,4 < f \leq 3,8$ (notes 1 and 2)	-40 dBm	0 dBm (notes 1 and 2)
$3,8 < f \leq 4,8$ (notes 1 and 2)	-30 dBm	0 dBm (notes 1 and 2)
$4,8 < f \leq 6$	-30 dBm	-30 dBm
$6 < f \leq 8,5$	0 dBm	0 dBm
$8,5 < f \leq 9$ (note 2)	-25 dBm	0 dBm (note 2)
$9 < f \leq 10,6$	-25 dBm	-25 dBm
$10,6 < f$	-45 dBm	-45 dBm

NOTE 1: Within the band 3,1 GHz to 4,8 GHz, devices implementing **Low Duty Cycle (LDC) mitigation technique** (see clause 4.5.3) are permitted to operate with a maximum mean e.i.r.p. spectral density of -41,3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz.

NOTE 2: Within the bands 3,1 GHz to 4,8 GHz and 8,5 GHz to 9 GHz, devices implementing **Detect And Avoid (DAA) mitigation technique** (see clause 4.5.1) are permitted to operate with a maximum mean e.i.r.p. spectral density of -41,3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz.

6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C

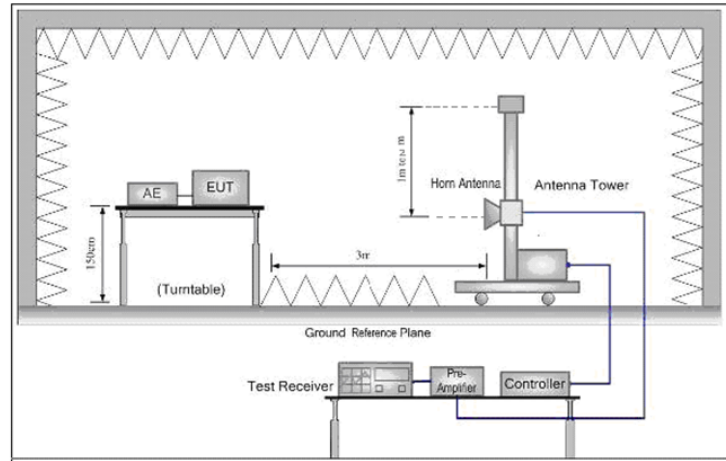
Humidity: 56.3 % RH

Atmospheric Pressure: 1020 mbar

6.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	Keep the EUT in continuous transmitting mode with modulation

6.3.3 Test Setup Diagram



6.3.4 Measurement Procedure and Data

When measuring maximum peak power from the radio device under test, the spectrum analyser used should be configured as follows:

Frequency: The measurement shall be performed over the frequency range defined in the relevant harmonized standard

Resolution bandwidth: Equal to or greater than 3 MHz but not greater than 50 MHz. Use always the highest available bandwidth for the signal to be measured. If the choice of bandwidth makes a difference then choosing too low a bandwidth will lead to an overestimate of the peak power. When measurement are performed using a lower bandwidth than 50 MHz the correction factor $20\log(50\text{MHz}/\text{actual resolution bandwidth})$ shall be used to calculate the peak power limits given in the relevant harmonized standards. For a more detailed discussion please refer to clause A.3.

NOTE: For peak power measurements, the best signal to noise ratio is usually obtained with the widest available resolution bandwidth.

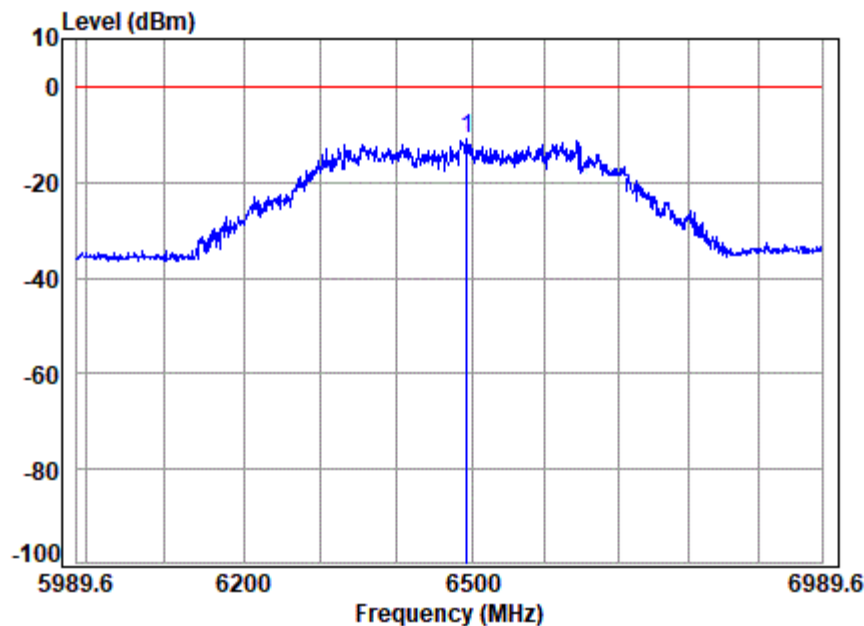
Video bandwidth: Not less than the resolution bandwidth.

Detector mode: Peak.

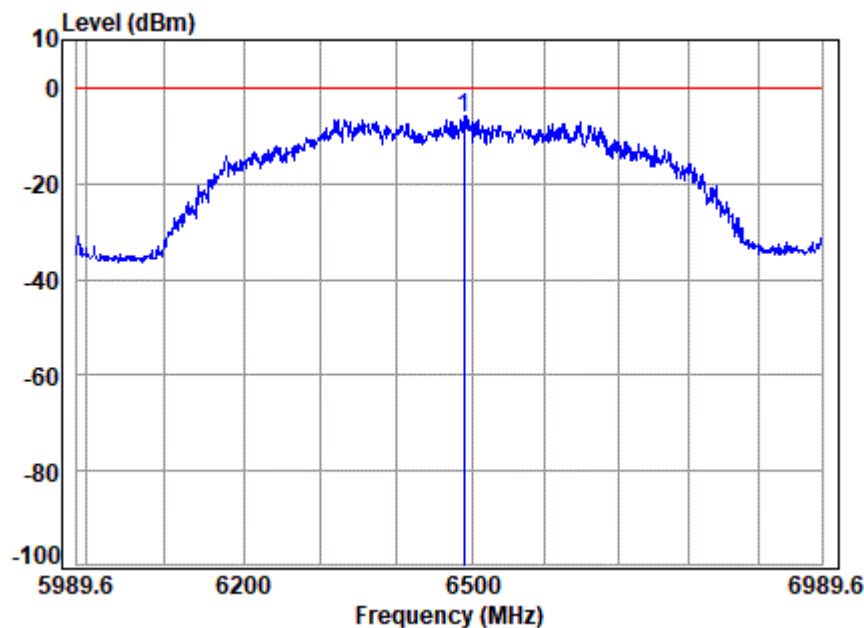
Display mode: Max. Hold.

Measurements shall be continued with the transmitter emitting the normal test signal until the displayed trace no longer changes.



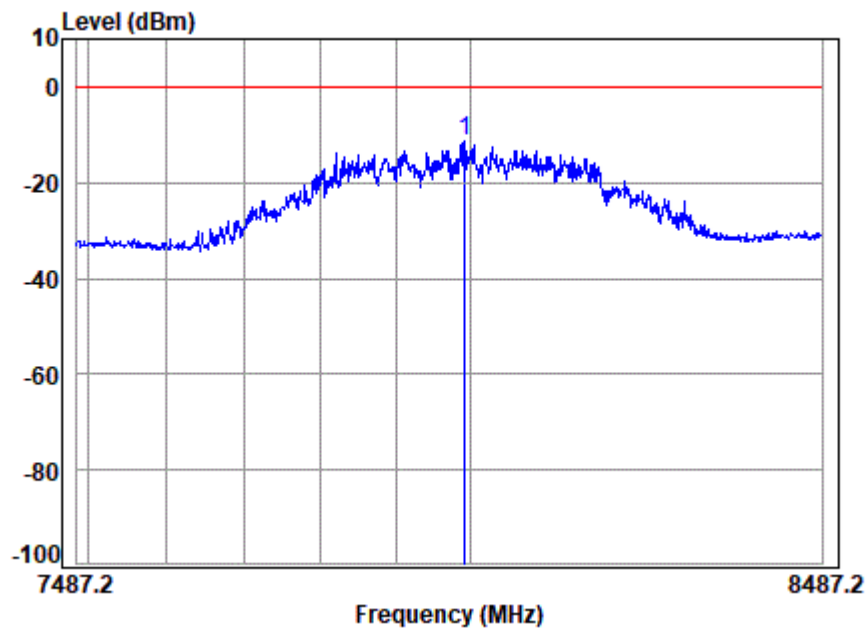


Test Frequency (MHz)	Peak Power (dBm/50MHz)	Limit (dBm/MHz)	Margin (dBm/MHz)	Polarization	Result
6489.6	-10.29	0	10.29	Horizontal	Pass

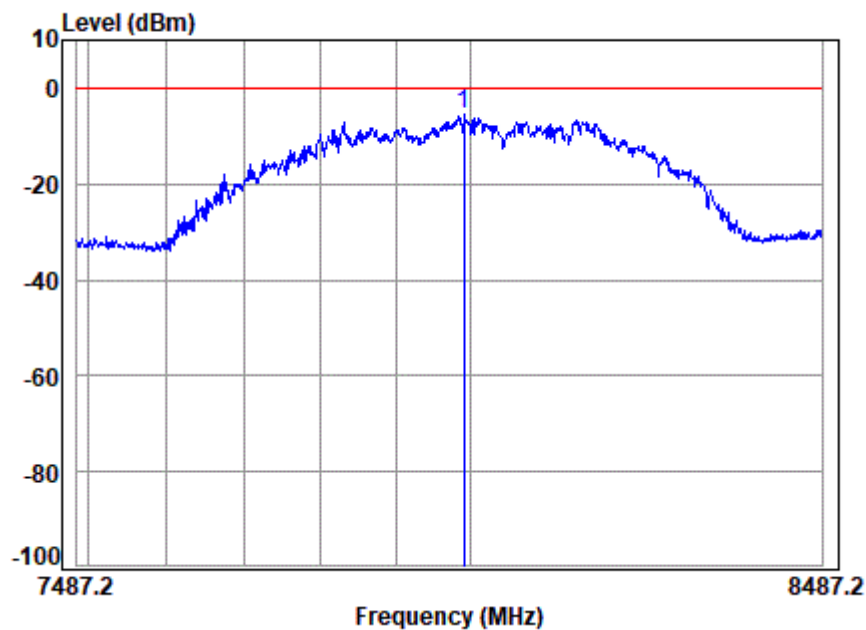


Test Frequency (MHz)	Peak Power (dBm/50MHz)	Limit (dBm/MHz)	Margin (dBm/MHz)	Polarization	Result
6489.6	-5.31	0	5.31	Vertical	Pass





Test Frequency (MHz)	Peak Power (dBm/50MHz)	Limit (dBm/MHz)	Margin (dBm/MHz)	Polarization	Result
7987.2	-10.89	0	10.89	Horizontal	Pass



Test Frequency (MHz)	Peak Power (dBm/50MHz)	Limit (dBm/MHz)	Margin (dBm/MHz)	Polarization	Result
7987.2	-5.66	0	5.66	Vertical	Pass



6.4 Other Emissions

Test Requirement EN 302 065-1 Clause 4.3.6

Test Method: EN 303 883, clause 7.4.3

Measurement Distance: 3m

Limit:

Frequency range	Limit values for OE
47 MHz to 74 MHz	-54 dBm/100 kHz
87,5 MHz to 118 MHz	-54 dBm/100 kHz
174 MHz to 230 MHz	-54 dBm/100 kHz
470 MHz to 862 MHz	-54 dBm/100 kHz
otherwise in band 30 MHz to 1 000 MHz	-36 dBm/100 kHz
1 000 MHz to 40 000 MHz (see note)	-30 dBm/1 MHz

NOTE: Not applicable for UE emissions within the permitted range of frequencies.

6.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C

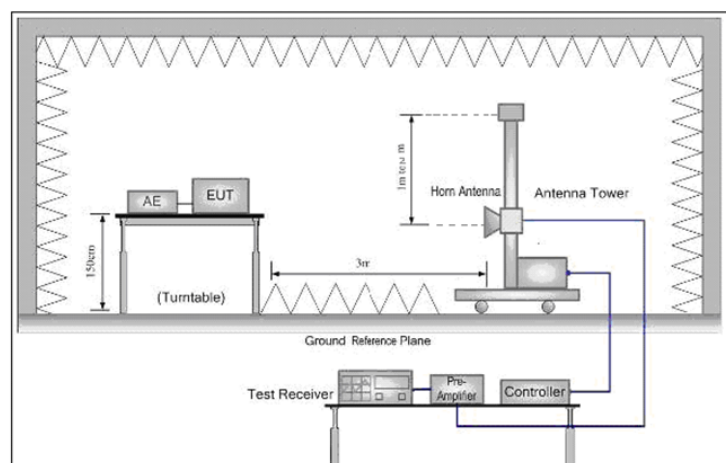
Humidity: 56.3 % RH

Atmospheric Pressure: 1020 mbar

6.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	Keep the EUT in continuous transmitting mode with modulation

6.4.3 Test Setup Diagram



6.4.4 Measurement Procedure and Data

The following shall be applied to the combination(s) of the radio device and its intended antenna(s). In the case that the RF power level is user adjustable, all measurements shall be made with the highest power level available to the user for that combination.

Measurements shall be carried out over the frequency ranges as shown in the relevant harmonized standards.

When measuring maximum mean power spectral density from the radio device under test, the spectrum analyser or equivalent shall be configured as follows unless otherwise stated:

Resolution bandwidth: 1 MHz

Video bandwidth: Not less than the resolution bandwidth.

Detector mode: RMS (power average).

Display Mode: max. hold.

Average time 1 ms or less (per sweep point on spectrum analyser scan).

NOTE: "average time" may not be an explicit setting. In some cases it may be determined by setting the number of measurement points and the time taken for a sweep.

Frequency Span: Equal to or less than the number of sweep points multiplied by the resolution bandwidth, preferably less than half as much.

The measurement results shall be determined and recorded over the specified frequency ranges given in the relevant harmonized standards.



Tx Ch5: 6489.6MHz					
Test Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Margin (dBm/MHz)	Polarization	Result
1300.86	-53.87	-30	23.87	Horizontal	Pass
5000.00	-47.28	-30	17.28	Horizontal	Pass
16268.14	-32.67	-30	2.67	Horizontal	Pass
1792.94	-53.90	-30	23.90	Vertical	Pass
4999.28	-47.12	-30	17.12	Vertical	Pass
16793.68	-32.04	-30	2.04	Vertical	Pass

Tx Ch9: 7987.2MHz					
Test Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Margin (dBm/MHz)	Polarization	Result
1308.40	-54.94	-30	24.94	Horizontal	Pass
5001.00	-47.54	-30	17.54	Horizontal	Pass
16362.46	-32.86	-30	2.86	Horizontal	Pass
1300.86	-55.94	-30	25.94	Vertical	Pass
4999.55	-47.39	-30	17.39	Vertical	Pass
16939.94	-31.62	-30	1.62	Vertical	Pass



6.5 Receiver spurious emissions

Test Requirement EN 302 065-1 Clause 4.4.2

Test Method: EN 303 883, clause 7.4.5

Measurement Distance: 3m

Limit:

Table 5: Narrowband spurious emission limits for receivers

Frequency range	Limit
30 MHz to 1 GHz	-57 dBm (e.r.p.)
above 1 GHz to 40 GHz	-47 dBm (e.i.r.p.)

Table 6: Wideband spurious emission limits for receivers

Frequency range	Limit
30 MHz to 1 GHz	-47 dBm/MHz (e.r.p.)
above 1 GHz to 40 GHz	-37 dBm/MHz (e.i.r.p.)

6.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C

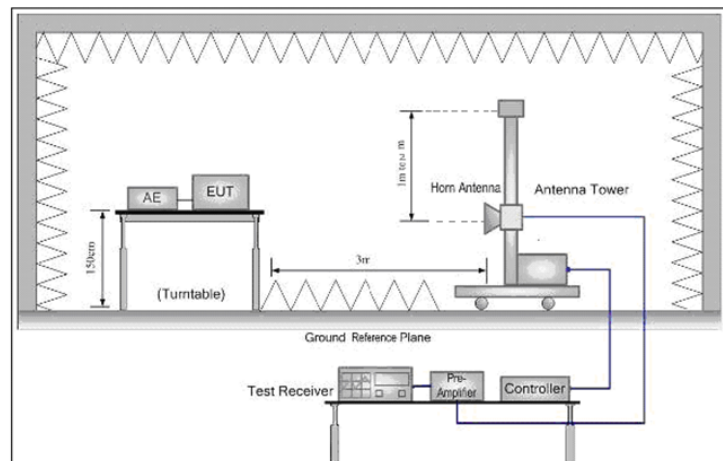
Humidity: 56.3 % RH

Atmospheric Pressure: 1020 mbar

6.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Keep the EUT in receiving mode

6.5.3 Test Setup Diagram



6.5.4 Measurement Procedure and Data

Measurements shall be carried out over the frequency range from 30 MHz to 40 GHz.

The measurements shall be performed only under the following conditions:

The equipment shall be tested in the standby/receive mode among frequencies as defined in clauses 7.3.1.

Where these measurements are made with a spectrum analyser, the following settings shall be used for narrowband emissions:

resolution BW: 100 kHz;

video BW: 300 kHz;

detector mode: positive peak;

averaging: off;

span: 100 MHz; it is also allowed to use different values of the frequency span depending on the ranges covered by the measuring antennas, cables and amplifiers available;

amplitude: adjust for middle of the instrument's range;

sweep time: 1 s.

For measuring emissions that exceed the level of 6 dB below the applicable limit, the resolution bandwidth shall be switched to 30 kHz and the span shall be adjusted accordingly. If the level does not change by more than 2 dB, it is a narrowband emission; the observed value shall be recorded. If the level changes by more than 2 dB, the emission is a wideband emission and its level shall be measured and recorded. The measurement result for wideband spurious

emissions has to be recalculated for 1 MHz bandwidth.

The results obtained shall be compared to the limits given in table 3 in order to prove compliance with the requirement.



Rx Ch5: 6489.6MHz					
Test Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Margin (dBm/MHz)	Polarization	Result
1278.49	-75.97	-47	28.97	Horizontal	Pass
5551.07	-66.95	-47	19.95	Horizontal	Pass
16793.68	-54.10	-47	7.10	Horizontal	Pass
1293.36	-76.78	-47	29.78	Vertical	Pass
5254.44	-67.27	-47	20.27	Vertical	Pass
16793.68	-54.31	-47	7.31	Vertical	Pass

Rx Ch9: 7987.2MHz					
Test Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Margin (dBm/MHz)	Polarization	Result
1282.19	-76.04	-47	29.04	Horizontal	Pass
5471.42	-67.33	-47	20.33	Horizontal	Pass
16745.21	-54.53	-47	7.53	Horizontal	Pass
1300.86	-76.37	-47	29.37	Vertical	Pass
5471.42	-66.59	-47	19.59	Vertical	Pass
16793.68	-54.35	-47	7.35	Vertical	Pass



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6.6 Receiver interference handling

Test Requirement EN 302 065-1 Clause 4.4.3
Test Method: TS 103 361 V1.1.1, clause 9.3

Limit:

Refer to TS 103 361 V1.1.1, clause 9.4 for reference test scenarios

Test limit is defined by client.

6.6.1 E.U.T. Operation

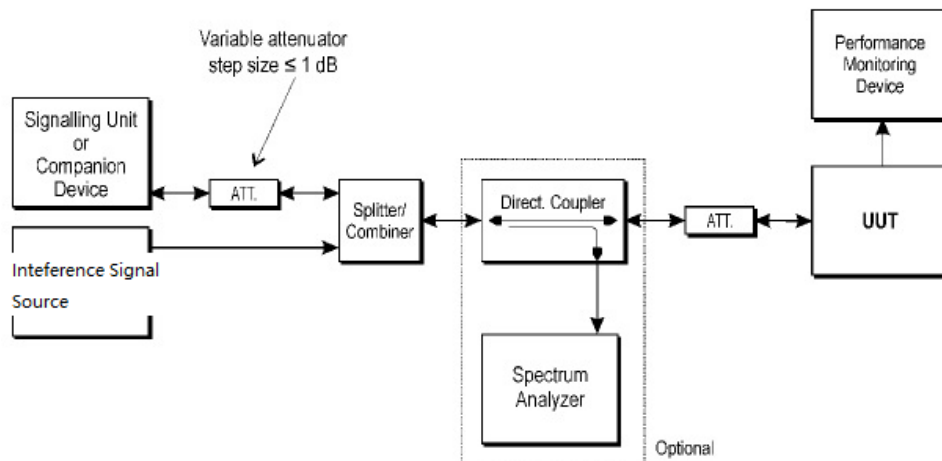
Operating Environment:

Temperature: 23.8 °C Humidity: 47.0 % RH Atmospheric Pressure: 1020 mbar

6.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Keep the EUT in receiving mode

6.6.3 Test Setup Diagram



6.6.4 Measurement Procedure and Data

- 1) Find the potential interferers inside the interferer test frequency range (interferer centre frequency inside interferer test frequency range) using the appropriate interferer table for the application in clause 7 (tables 3, 5, 7, 9, 11, 13, 15).
- 2) If there are more than 3 interferers, only use the 3 strongest ones (strongest power @ device; see clause 7).
- 3) The interferers found after step 1 and 2 are the applicable interferers (see figure 4).
- 4) Choose one of the options for the test signal defined in clause 8.
- 5) Set the interferer power such that the power at the position of the device is equal to the power mentioned in the interferer list as "power@device".

If the test is performed in a scenario and the attenuation of the scenario is not already considered in the interferer power, the interferer power shall be set such that the power at the scenario equals the power mentioned in the interferer list as "power@device".

Refer to TS 103 361 V1.1.1, clause 9.4

For Communications device:

Performance criterion Sensitivity, i.e. receiver minimum power level required to achieve a maximum of Po PER for N bytes payload. P0 and N should be defined in a specific communication standard, covering all relevant ISO OSI layers 1.

Maximum expected PER P0	The maximum expected PER is 100%(defined by manufacture)
Packet size N for the expected PER P0	20 bytes(defined by manufacture)

Pass



6.7 Low Duty Cycle

Test Requirement EN 302 065-1 Clause 4.5.3

Test Method: EN 303 883, clause 7.4.8

Limit:

Parameter		Limit
Maximum transmitter on time	Ton max	5 ms per transmission
Mean transmitter off time	Toff mean	≥ 38 ms (averaged over 1 s)
Sum transmitter off time	Σ Toff	> 950 ms per second
Sum transmitter on time	Σ Ton	< 18 s per hour
NOTE: An LDC trade off, power versus time, as described in Annex C, shall be seen as an equivalent mitigation technique according to [i.6]; details see CEPT report 45 [i.8], clause 3.1.1.		

6.7.1 E.U.T. Operation

Operating Environment:

Temperature: 23.8 °C

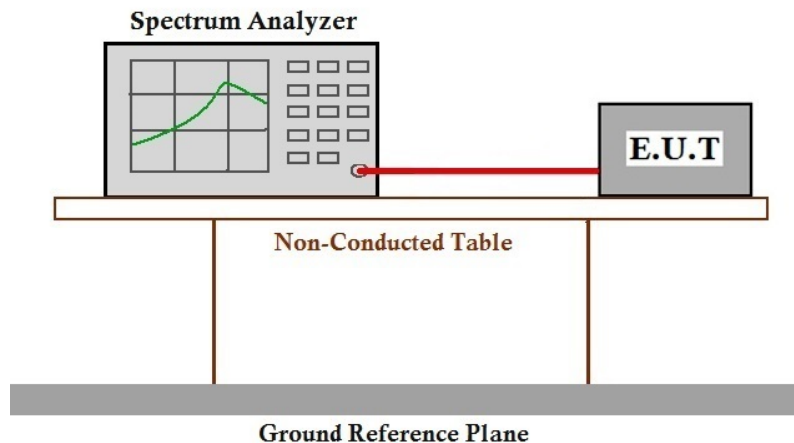
Humidity: 47.0 % RH

Atmospheric Pressure: 1020 mbar

6.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	05	Normal operating_Keep the EUT communication with the companion device.

6.7.3 Test Setup Diagram



6.7.4 Measurement Procedure and Data

When measuring Low Duty Cycle from the radio device under test, the spectrum analyser or equivalent shall be configured as follows unless otherwise stated:

Resolution Bandwidth: Maximum available bandwidth equal or greater than 3 MHz and less or equal 50 MHz

Video Bandwidth: Not less than the resolution bandwidth

Frequency Span: Measuring in Zero Span Mode and take the centre frequency determined at highest mean power spectral density.

Sweep Time: Time for spectrum analyser sweep (over one span). Appropriate settings shall be calculated with following formulas.

The first sweep should be an overview about pulse frame timing. Manufacturer should also declare this timing. Choose

a pulse frame with maximum Ton and minimum Toff time for further measurements. One package includes onetime Ton

and onetime Toff regarding Tdis (Disregard Time see ETSI TS 103 060 [i.18]). Frame periods may vary because of different coding schemes.

The second sweep focus on one selected pulse frame period including maximum Ton and minimum Toff time.

For measuring Ton set the transmission start marker at first rising edge of pulse frame. Set end marker at last falling edge of pulse frame. Take Disregard-Time Tdis into account for choosing correct end of active transmission Ton.

Calculate Ton from start marker to end marker position.

For measuring Toff set the transmission start marker at the first rising edge of pulse frame. Set end marker at the next transmission start first rising edge of pulse frame. Calculate the sum of Ton and Toff from both marker positions. For calculating Toff subtract Ton time from this result.

Maximum sweep times are limited in different specific EN because they correlate with maximum Ton and minimum Toff periods.

Test Item	Test Frequency (MHz)	Limit	Result
	6489.6		
Maximum transmitter on time	0.18ms	5 ms per transmission	Pass
Mean transmitter off time	999.82ms	≥ 38 ms(averaged over 1 s)	Pass
Sum transmitter off time	999.82ms	> 950 ms per second	Pass
Sum transmitter on time	0.648s	< 18 s per hour	Pass

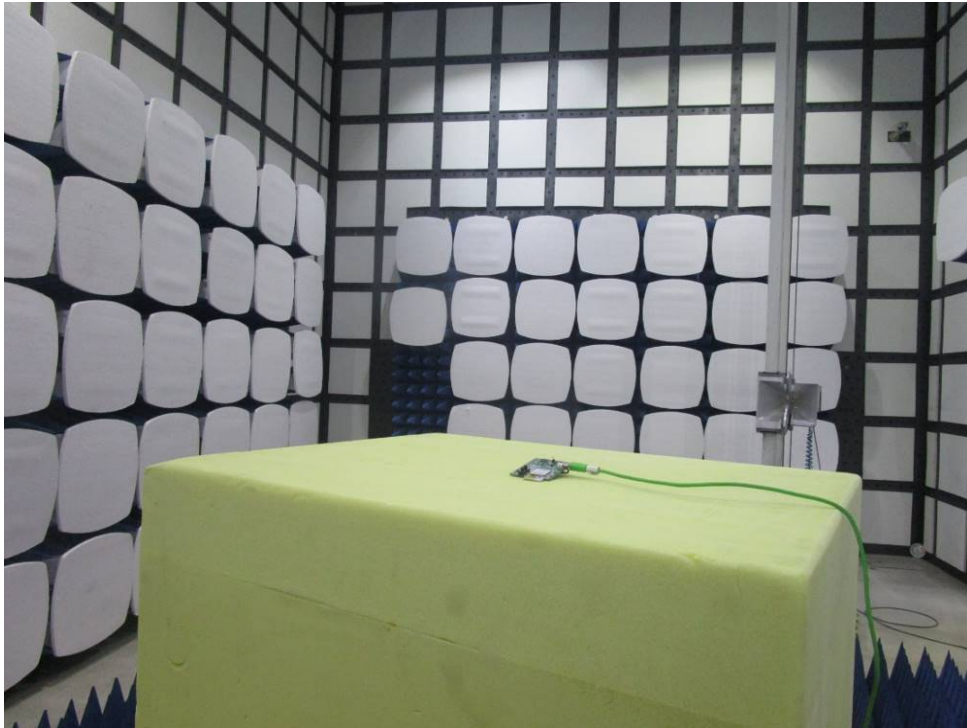


7 Test Setup Photo

Other Emissions



Receiver spurious emissions



8 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for SZCR2110023549AT

- End of the Report -

