TEST REPORT

Application No.:	SHEM1905013673CR
Applicant:	Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Applicant:	No.555 Qianmo Road, Binjiang District, Hangzhou 310052, China
Manufacturer:	Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Manufacturer:	No.555 Qianmo Road, Binjiang District, Hangzhou 310052, China
Factory:	1, Hangzhou Hikvision Technology Co., Ltd. 2, Hangzhou Hikvision Electronics Co., Ltd.
Address of Factory:	1, No.700,Dongliu Road, Binjiang District, Hangzhou City,Zhejiang, 310052, China 2, No.299,Qiushi Road,Tonglu Economic Development Zone,Tonglu County, Hangzhou,Zhejiang,310052,China
Equipment Under Test (EUT):	
EUT Name:	Wireless Siren
Model No.:	DS-PSG-WO-868, DS-PSG-WO-868UHK, DS-PSG-WO-868CKV, DS-PSG-WO-868UVS, DS-PSG-WO-868KVO, DS-PSG-WO-868HUN ¤
¤	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Standard(s) :	EN 300 220-1 V3.1.1, EN 300 220-2 V3.1.1
Date of Receipt:	2019-05-30
Date of Test:	2019-06-04 to 2019-06-06
Date of Issue:	2019-06-27
Test Result:	**Pass***

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

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.

CE

Parlam Zhan
E&E Section Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

检验检测专用章 Inspection & Testing Services
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. Testing Center EMC Section

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Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2019-06-27	/

Authorized for issue by:				
				
		Vincent Zhu / Project Engineer		
				
		Eddy Zong / Reviewer		

2 Test Summary

Radio Spectrum Matter Part

Item	Standard	Method	Requirement	Result
Effective Radiated Power-Radiated	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.2.2.2	EN 300 220 V3.1.1 Clause 5.2	Pass
Maximum Effective Radiated Power spectral density	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.3.2	EN 300 220 V3.1.1 Clause 5.3	Pass
Duty Cycle	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.4.2	EN 300 220 V3.1.1 Clause 5.5	Pass
Occupied Bandwidth	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.6.2	EN 300 220 V3.1.1 Clause 5.6	Pass
Tx Out Of Band Emissions	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.8.2	EN 300 220 V3.1.1 Clause 5.8	Pass
Tx Unwanted emissions in the spurious domain(30MHz-1GHz)	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.9.3.1	EN 300 220 V3.1.1 Clause 5.9	Pass
Tx Unwanted emissions in the spurious domain(above 1GHz)	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.9.3.1	EN 300 220 V3.1.1 Clause 5.9	Pass
Rx Unwanted emissions in the spurious domain(30MHz-1GHz)	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.9.3.1	EN 300 220 V3.1.1 Clause 5.9	Pass
Rx Unwanted emissions in the spurious domain(above 1GHz)	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.9.3.1	EN 300 220 V3.1.1 Clause 5.9	Pass
Transient power	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.10.2	EN 300 220 V3.1.1 Clause 5.10	Pass
Blocking	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.18.2	EN 300 220 V3.1.1 Clause 5.18	Pass
Operating frequency	EN 300 220 V3.1.1	EN 300 220 V3.1.1 Clause 5.1.2	EN 300 220 V3.1.1 Clause 5.1	Pass

Declaration of EUT Family Grouping:

Note: There are series models mentioned in this report, and they are the identical in electrical and electronic characters. Only the model DS-PSG-WO-868 was tested since their differences were the model number and appearance.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply: DC 3V by 4* CR123A battery
Test voltage: DC 3V
Operation Frequency 868MHz
Modulation Technique: 2GFSK
Antenna Type: Spiral antenna
Number of Channel: 1

4.2 Environment Parameter

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Value	Temperature(°C)	Voltage(V)
Normal Temperature & Normal Voltage	25℃	DC 3V
Low Extreme Test Temperature & Low Extreme Test Voltage	0℃	DC 2.55V
High Extreme Test Temperature & Low Extreme Test Voltage	35℃	DC 2.55V
Low Extreme Test Temperature & High Extreme Test Voltage	0℃	DC 3V
High Extreme Test Temperature & High Extreme Test Voltage	35℃	DC 3V

4.3 Description of Support Units

The EUT has been tested as an independent unit.

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	±8.4 x 10-8
2	Timeout	±2s
3	Duty cycle	±0.37%
4	Occupied Bandwidth	±3%
5	RF conducted power	±0.6dB
6	RF power density	±2.84dB
7	Conducted Spurious emissions	±0.75dB
8	RF Radiated power	±4.6dB (Below 1GHz)
		±4.1dB (Above 1GHz)
9	Radiated Spurious emission test	±4.2dB (Below 30MHz)
		±4.4dB (30MHz-1GHz)
		±4.8dB (1GHz-18GHz)
		±5.2dB (Above 18GHz)
10	Temperature test	±1°C
11	Humidity test	±3%
12	Supply voltages	±1.5%
13	Time	±3%

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

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

4.6 Test Facility

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

• CNAS (No. CNAS L0599)

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• NVLAP (Certificate No. 201034-0)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program(NVLAP). Certificate No. 201034-0.

• FCC –Designation Number: CN5033

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN5033. Test Firm Registration Number: 479755.

• Innovation, Science and Economic Development Canada

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

IC Registration No.: 8617A-1. CAB Identifier: CN0020.

• VCCI (Member No.: 3061)

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Conducted Test					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2018-12-20	2019-12-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2018-08-13	2019-08-12
Signal Generator	R&S	SMR20	SHEM006-1	2018-08-13	2019-08-12
Signal Generator	Agilent	N5182A	SHEM182-1	2018-08-13	2019-08-12
Communication Tester	R&S	CMW270	SHEM183-1	2018-08-13	2019-08-12
Switcher	Tonscend	JS0806	SHEM184-1	2018-08-13	2019-08-12
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2018-08-13	2019-08-12
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2017-09-25	2020-09-24
AC Power Stabilizer	WOCEN	6100	SHEM045-1	2018-12-26	2019-12-25
DC Power Supply	MCN	MCH-303A	SHEM210-1	2018-12-26	2019-12-25
Conducted test Cable	/	RF01~RF04	/	2018-12-26	2019-12-25
Radiated Test					
EMI test Receiver	R&S	ESU40	SHEM051-1	2018-12-20	2019-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2018-12-20	2019-12-19
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2017-04-10	2020-04-09
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2017-02-28	2020-02-27
Antenna (25MHz-3GHz)	Schwarzbeck	HL562	SHEM010-1	2017-02-28	2020-02-27
Horn Antenna (1-8GHz)	Schwarzbeck	HF906	SHEM009-1	2017-10-24	2020-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2017-01-14	2020-01-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2017-12-03	2020-12-02
Pre-amplifier (9KHz-2GHz)	CLAVIIO	BDLNA-0001	SHEM164-1	2018-08-13	2019-08-12
Pre-amplifier (1-18GHz)	CLAVIIO	BDLNA-0118	SHEM050-2	2018-08-13	2019-08-12
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2018-12-20	2019-12-19
Signal Generator	R&S	SMR40	SHEM058-1	2018-08-13	2019-08-12
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2017-07-22	2020-07-21
RE test Cable	/	RE01, RE02, RE06	/	2018-12-26	2019-12-25

6 Radio Spectrum Matter Test Results

6.1 Duty Cycle

Test Requirement EN 300 220 V3.1.1 Clause 5.5

Test Method: EN 300 220 V3.1.1 Clause 5.4.2

Limit:

Table 6: Minimum of hop channels and other requirements for FHSS

Sub-band	Number of hop channels/bandwidth (BW)	
865 MHz to 868 MHz	≥ 58 at ≤ 50 kHz BW each	LBT or < 1 % TX duty cycle (see note 1)
863 MHz to 870 MHz (see note 2)	≥ 47 at ≥ 100 kHz BW each	LBT or < 0,1 % TX duty cycle (see note 1)
NOTE 1: The duty cycle applies to the entire transmission (not at each hopping channel). NOTE 2: FHSS as shown in the present table shall not be used in the frequency bands for alarms as defined in tables 1 and 5.		

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.1.2 Measurement Procedure and Data

1) The EUT shall be set to operate for not less than 10 transmissions

2) Using suitable analysis software the start time and stop time of each sequence of samples above PThreshold shall be obtained. Between the saved start and stop times of each individual burst, the TOn time shall be calculated. These TOn values shall be saved. Between the saved stop and start times of two subsequent bursts, the TOff time shall be calculated. These TOff values shall be saved.

3) Within the calculated TOff times, any interval less than Tdis shall be discarded

4) Calculate the duty cycle on an observation interval.

The detailed test data see: Appendix A for SHEM190501367302

6.2 Occupied Bandwidth

Test Requirement EN 300 220 V3.1.1 Clause 5.6

Test Method: EN 300 220 V3.1.1 Clause 5.6.2

Limit:

Table 7: Maximum radiated power density, bandwidth and duty cycle limits for other spread spectrum than FHSS

Sub-band	Maximum Occupied bandwidth	Maximum radiated power density e.r.p.	Duty cycle
865 MHz to 868 MHz	0,6 MHz	6,2 dBm / 100 kHz	1%
865 MHz to 870 MHz	3,0 MHz	-0,8 dBm / 100 kHz	0.1%
863 MHz to 870 MHz	7,0 MHz	-4,5 dBm / 100 kHz	0.1%

6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.2.2 Measurement Procedure and Data

The spectrum analyser shall be configured as below:

Set RBW: 1 % to 3 % of OCW without being below 100 Hz

VBW: >=3*RBW

Span: >=2 x Operating Channel width

Detector Mode: RMS

Trace: Max hold

When the trace is completed the peak value of the trace shall be located and the analyser marker placed on this peak.

The 99 % occupied bandwidth function of the spectrum analyser shall be used to measure the occupied bandwidth of the signal.

The detailed test data see: Appendix A for SHEM190501367302

6.3 Tx Out Of Band Emissions

Test Requirement EN 300 220 V3.1.1 Clause 5.8

Test Method: EN 300 220 V3.1.1 Clause 5.8.2

Limit:

Table 9: Adjacent channel power limits applicable to narrowband systems

	Channel separation < 20 kHz	**Channel separation >=20 kHz**
Normal test conditions	10uW	200nW
Extreme test conditions	32uW	640nW
NOTE: These limits also apply to spread spectrum equipment.		

6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.3.2 Measurement Procedure and Data

1) The test equipment shall be configured as below:

Centre frequency = Operating Frequency

Span = 6 x Operating Channel width

RBW = 1 kHz

Detector Function = RMS

Trace Mode = Linear AVG / Max Hold

Operation of the EUT shall be started, on the highest operating frequency as declared by the manufacturer, with the appropriate test signal.

The signal shape is recorded when stable and shall be below the spectrum mask Out Of Band for operating channel.

2) The test equipment shall be reconfigured as below:

Centre frequency = fclow

Span = 2 x (500 kHz + fclow - flow_OFB)

Operation of the EUT is restarted, with the appropriate test signal, on the lowest operating frequency as declared by the manufacturer.

If the equipment is using only one operating Frequency in the operational Frequency Band, measurement shall be performed the nominal operating frequency.

The signal shape is recorded when stable; and shall be below the spectrum mask for operating channel and the spectrum mask for operational frequency band.

3) The test equipment shall be reconfigured as below:

Centre frequency = fchigh

Span = 2 x (500 kHz + fhigh_OFB - fchigh)

Operation of the EUT is restarted, with the appropriate test signal, on the highest Operating Frequency as declared by the manufacturer.

4) The signal shape is recorded when stable and shall be below the spectrum mask for Out Of Band emissions for operating channel and for operational Frequency Band.

5) The measurements in step 1 to step 5 shall be repeated under extreme test conditions.

The detailed test data see: Appendix A for SHEM190501367302

6.4 Tx Unwanted emissions in the spurious domain(30MHz-1GHz)

Test Requirement EN 300 220 V3.1.1 Clause 5.9

Test Method: EN 300 220 V3.1.1 Clause 5.9.3.1

Limit:

Table 11: Spurious domain emission limits

Frequency / State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
Operating	4 nW	250 nW	1 □W
Standby	2 nW	2 nW	20 nW

6.4.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.4.2 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

The detailed test data see: Appendix A for SHEM190501367302

6.5 Tx Unwanted emissions in the spurious domain(above 1GHz)

Test Requirement EN 300 220 V3.1.1 Clause 5.9

Test Method: EN 300 220 V3.1.1 Clause 5.9.3.1

Limit:

Table 11: Spurious domain emission limits

Frequency / State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
Operating	4 nW	250 nW	1 □W
Standby	2 nW	2 nW	20 nW

6.5.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.5.2 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

The detailed test data see: Appendix A for SHEM190501367302

6.6 Rx Unwanted emissions in the spurious domain(30MHz-1GHz)

Test Requirement EN 300 220 V3.1.1 Clause 5.9

Test Method: EN 300 220 V3.1.1 Clause 5.9.3.1

Limit:

The equipment shall either:

a) remain on channel, for channelized equipment within the limits stated in clause 7.1.3, or within the assigned operating frequency band, for non-channelized equipment, whilst the radiated or conducted power is greater than the spurious emission limits; or

b) the equipment cease to function below the providers declared operating voltage.

6.6.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.6.2 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

The detailed test data see: Appendix A for SHEM190501367302

6.7 Rx Unwanted emissions in the spurious domain(above 1GHz)

Test Requirement EN 300 220 V3.1.1 Clause 5.9

Test Method: EN 300 220 V3.1.1 Clause 5.9.3.1

6.7.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.7.2 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

The detailed test data see: Appendix A for SHEM190501367302

6.8 Transient power

Test Requirement EN 300 220 V3.1.1 Clause 5.10
Test Method: EN 300 220 V3.1.1 Clause 5.10.2
Limit:

The total listen time, t_L, consists of a fixed part, t_F, and a pseudo random part, t_{PS}, as the following:

$$t_L = t_F + t_{PS}$$

a) The fixed part of the minimum listening time, t_F, shall be 5 ms.
b) The pseudo random listening time t_{PS} shall be randomly varied between 0 ms and a value of 5 ms or more in
equal steps of approximately 0,5 ms as the following:

- If the channel is free from traffic at the beginning of the listen time, t_L, and remains free throughout the fixed part of the listen time, t_F, then the pseudo random part, t_{PS}, is automatically set to zero by the equipment itself.
- If the channel is occupied by traffic when the equipment either starts to listen or during the listen period, then the listen time commences from the instant that the intended channel is free. In this situation the total listen time t_L shall comprise t_F and the pseudo random part, t_{PS}.

The limit for total listen time for the receiver consists of the sum of a) and b) together.
Algorithmic details and values for a) and b) shall be declared by the provider of the equipment.

6.8.1 E.U.T. Operation

Operating Environment:
Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar
Test mode b:TX mode_Keep the EUT in transmitting mode

6.8.2 Measurement Procedure and Data

The output of the EUT shall be connected to a spectrum analyser or equivalent measuring equipment.

The measurement shall be undertaken in zero span mode. The analyser's centre frequency shall be set to an offset from the operating centre frequency.

The detailed test data see: Appendix A for SHEM190501367302

6.9 TX behaviour under Low Voltage Conditions

Test Requirement EN 300 220-2 V3.1.1 Clause 4.3.8

Test Method: EN 300 220 V3.1.1 Clause 5.12.2

Limit:

1）**Tx on-time for a single transmission**

The limit for a single transmission TX on-time is 1 s and the actual value shall be declared by the provider.

2）Tx on-time for a transmission dialogue

The time limit for a transmission dialogue or a polling sequence is 4 s and the actual value shall be declared by the provider.

3）Maximum Tx on-time within a period of 1 hour for devices using LBT + AFA

The maximum transmission Tx on-time within a period of 1 hour shall be declared by the provider. Sufficient information about the performed Tx on-time tests shall be provided.

A transmitter shall not exceed an accumulated maximum Tx on-time of 100 s within a period of 1 hour for any 200 kHz spectrum.

6.9.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.9.2 Measurement Procedure and Data

Step 1:

Operation of the EUT shall be started, on Operating Frequency as declared by the manufacturer, with the appropriate test signal and with the EUT operating at nominal operating voltage.

The centre frequency of the transmitted signal shall be measured and noted.

Step 2:

The operating voltage shall be reduced by appropriate steps until the voltage reaches zero.

The centre frequency of the transmitted signal shall be measured and noted.

Any abnormal behaviour shall be noted.

The detailed test data see: Appendix A for SHEM190501367302

6.10 Blocking

Test Requirement EN 300 220 V3.1.1 Clause 5.18

Test Method: EN 300 220 V3.1.1 Clause 5.18.2

6.10.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.10.2 Measurement Procedure and Data

Signal generator A shall be set to an appropriate modulated test signal at the operating frequency of the EUT receiver.

Signal generator B shall be unmodulated.

Measurements shall be carried out at frequencies of the unwanted signal at approximately the frequency(ies) offset(s) defined in technical requirement avoiding those frequencies at which spurious responses occur. Additional measurement points may be requested by technical requirements clause.

If several operational frequency bands are used by the equipment, at least one blocking measurement by bands has to be performed.

Step 1:

Signal generator B shall be powered off. Signal generator A shall be set to the minimum level which gives the wanted performance criterion of EUT or the reference level in Table 32, whichever is the higher The output level of generator A shall then be increased by 3 dB unless otherwise specified in technical requirement.

Step 2:

Signal generator B is powered on and set to operate at the nominal operating frequency - offset frequency.

Signal generator B is then switched on and the signal amplitude is adjusted to the minimum level at which the wanted performance criterion is not achieved.

With signal generator B settings unchanged, the receiver shall be replaced with a suitable RF power measuring equipment. The power into the measuring equipment shall be measured and noted.

The blocking level is then the conducted power received from generator B at the EUT antenna connector.

This can either be measured on the antenna connector for conducted test or be calculated for radiated test

The blocking level shall be higher or equal to the blocking power level requested in the technical requirement clause.

Step 3:

The measurement in steps 1 to 3 shall be repeated with signal offsets at required frequencies.

Step 4:

For equipment using CCA whatever is the receiver category, steps 1 to 4 shall be repeated with signal generator A level adjusted +13 dB higher than in the measurements.

The detailed test data see: Appendix A for SHEM190501367302

6.11 Operating frequency

Test Requirement EN 300 220 V3.1.1 Clause 5.1

Test Method: EN 300 220 V3.1.1 Clause 5.1.2

6.11.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.11.2 Measurement Procedure and Data

The detailed test data see: Appendix A for SHEM190501367302

6.12 Effective Radiated Power-Radiated

Test Requirement EN 300 220 V3.1.1 Clause 5.2

Test Method: EN 300 220 V3.1.1 Clause 5.2.2.2

Limit:

Table 7: Maximum radiated power density, bandwidth and duty cycle limits

Sub-band	Maximum Occupied bandwidth	Maximum radiated power density e.r.p.	Duty cycle
868.00MHz to 868.60MHz	The whole band	25 mW	1%

6.12.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting mode

6.12.2 Measurement Procedure and Data

1). The EUT was powered ON and placed on a 1.5m high table in the chamber. The antenna of the transmitter was extended to its maximum length. Receiver mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.

2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the undamental emission was maximized, a field strength measurement was made.

3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4). The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5). A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6). The output power into the substitution antenna was then measured.

7). Steps 5) and 6) were repeated with both antennas polarized.

8) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

where:

Pg is the generator output power into the substitution antenna.

The detailed test data see: Appendix A for SHEM190501367302

7 Photographs

Refer to the < Photographs >.

Appendix A for SHEM190501367302

a) Operation frequency

Measurement Conditions		Operating Frequency (MHz)	OCW (KHz)	Limit (MHz)	Result
T_{normal}	V_{norm}	867.887 -868.467	58.00	868-868.6	Pass

b) Effective Radiated Power

Operation Frequency	Measurement Conditions		ERP	Limit	Result
868	T_{normal}	V_{norm}	11.64dBm	14 dBm	PASS
	T_{upper}	V_{max}	11.75dBm	14 dBm	PASS
		V_{min}	11.62dBm	14 dBm	PASS
	T_{lower}	V_{max}	11.70dBm	14 dBm	PASS
		V_{min}	11.63dBm	14 dBm	PASS

c) Duty Cycle

Total Ton (ms)	Tobs (ms)	Duty Cycle	Limit	Result
80	3600000ms	0.0022%	0.1%	Pass

d) Occupied Bandwidth

Measurement Conditions		OBW (kHz)	Limit (MHz)	Result
T_{normal}	V_{norm}	58.00	868-868.6	Pass
T_{upper}	V_{max}	58.25	868-868.6	Pass
	V_{min}	57.95	868-868.6	Pass
T_{lower}	V_{max}	57.88	868-868.6	Pass
	V_{min}	57.85	868-868.6	Pass

e) Tx Out of Band Emissions

Test Conditions		Frequency Range	Highest Level Point (dBm)	Limit (dBm)	Result
Temperature	Voltage(DC)				
T_{norm}	V_{norm}	f ⩽ flow - 400 kHz	-47.68	-36	Pass
		Flow - 400 kHz ⩽ f ⩽ flow - 200 kHz	-42.15	-36	Pass
		flow - 200 kHz ⩽ f < flow	-37.69	-36 to 0	Pass
		Fhigh < f ⩽ fhigh + 200 kHz	-40.98	0 to -36	Pass
		Fhigh + 200 kHz ⩽ f ⩽ fhigh + 400 kHz	-40.85	-36	Pass
		Fhigh + 400 kHz ⩽ f	-45.36	-36	Pass
T_{upper}	V_{max}	f ⩽ flow - 400 kHz	-47.88	-36	Pass
		Flow - 400 kHz ⩽ f ⩽ flow - 200 kHz	-43.75	-36	Pass
		flow - 200 kHz ⩽ f < flow	-37.49	-36 to 0	Pass
		Fhigh < f ⩽ fhigh + 200 kHz	-40.98	0 to -36	Pass
		Fhigh + 200 kHz ⩽ f ⩽ fhigh + 400 kHz	-42.78	-36	Pass
		Fhigh + 400 kHz ⩽ f	-47.85	-36	Pass
	V_{min}	f ⩽ flow - 400 kHz	-50.02	-36	Pass
		Flow - 400 kHz ⩽ f ⩽ flow - 200 kHz	-43.96	-36	Pass
		flow - 200 kHz ⩽ f < flow	-41.75	-36 to 0	Pass
		Fhigh < f ⩽ fhigh + 200 kHz	-40.63	0 to -36	Pass
		Fhigh + 200 kHz ⩽ f ⩽ fhigh + 400 kHz	-46.59	-36	Pass
		Fhigh + 400 kHz ⩽ f	-48.18	-36	Pass
T_{lower}	V_{max}	f ⩽ flow - 400 kHz	-47.28	-36	Pass
		Flow - 400 kHz ⩽ f ⩽ flow - 200 kHz	-44.66	-36	Pass
		flow - 200 kHz ⩽ f < flow	-40.18	-36 to 0	Pass
		Fhigh < f ⩽ fhigh + 200 kHz	-42.58	0 to -36	Pass
		Fhigh + 200 kHz ⩽ f ⩽ fhigh + 400 kHz	-44.17	-36	Pass
		Fhigh + 400 kHz ⩽ f	-46.69	-36	Pass
	V_{min}	f ⩽ flow - 400 kHz	-47.28	-36	Pass
		Flow - 400 kHz ⩽ f ⩽ flow - 200 kHz	-41.85	-36	Pass
		flow - 200 kHz ⩽ f < flow	-42.22	-36 to 0	Pass
		Fhigh < f ⩽ fhigh + 200 kHz	-41.10	0 to -36	Pass
		Fhigh + 200 kHz ⩽ f ⩽ fhigh + 400 kHz	-43.68	-36	Pass
		Fhigh + 400 kHz ⩽ f	-45.82	-36	Pass

Note: -36 to 0&0 to -36 Decreases with the linear of the frequency

f) Transient Power

Measurement points: offset from centre frequency	Transient Power(dBm) at analyser RBW	Transient Power (dBm) at RBW_{ref}	Limit (dBm)	Result
-0,5 x OCW - 3 kHz	-24.86 @1kHz	-24.86@1kHz	0	PASS
0,5 x OCW + 3 kHz	-23.15@1kHz	-23.15@1kHz	0	PASS
-12,5 kHz or -OCW whichever is the greater	-16.56@10kHz	-16.56@1kHz	0	PASS
+12,5 kHz or +OCW whichever is the greater	-15.88@10kHz	-25.88@1kHz	0	PASS
-0,5 x OCW - 400 kHz	-36.75@100kHz	-56.75@1kHz	-27	PASS
0,5 x OCW + 400 kHz	-35.75@100kHz	-55.75@1kHz	-27	PASS
-0,5 x OCW -1 200 kHz	-32.28@300kHz	-57.05@1kHz	-27	PASS
0,5 x OCW + 1 200 kHz	-32.76@300kHz	-57.53@1kHz	-27	PASS
Remark: OCW is 160kHz from the result of sub clause a)				

g) TX behaviour under Low Voltage Conditions

Test Voltage	Test result (MHz)	Test result (output power for relative value)	Limit(MHz)	Result
V_{norm}	868.0	11.64dBm	863 to 865	Pass
V_{ext}	868.1	11.25dBm	863 to 865	Pass
V_{lowest}	868.1	cease function	/	Pass
Remark: No other exceeding any applicable limits were found during the tests				

h) Blocking

Receiver Category	Frequency Offset	Value(dBm)	Limit(dBm)	Result
2	+2MHz	-48.21	-69	Pass
2	-2MHz	-40.56	-69	Pass
2	+10MHz	-35.88	-44	Pass
2	-10MHz	-39.47	-44	Pass
2	+43.40MHz	-24.05	-44	Pass
2	-43.40MHz	-22.32	-44	Pass

i) Tx Unwanted emissions in the spurious domain

Test Frequency	Frequency (MHz)	Spurious Emission		Limit (dBm)	Over Limit (dBm)	Result
		Polarization	Level(dBm)			
30MHz-1GHz	63.092	Vertical	-77.82	-54.00	-23.82	Pass
	114.114	Vertical	-74.90	-54.00	-20.90	Pass
	178.758	Vertical	-71.94	-54.00	-17.94	Pass
	338.400	Vertical	-68.74	-36.00	-32.74	Pass
	616.372	Vertical	-62.50	-54.00	-8.50	Pass
	782.345	Vertical	-63.18	-54.00	-9.18	Pass
	48.502	Horizontal	-71.44	-54.00	-17.44	Pass
	54.452	Horizontal	-72.86	-54.00	-18.86	Pass
	278.067	Horizontal	-67.92	-36.00	-31.92	Pass
	492.469	Horizontal	-63.88	-54.00	-9.88	Pass
	731.920	Horizontal	-60.77	-54.00	-6.77	Pass
	922.516	Horizontal	-57.97	-36.00	-21.97	Pass

Test Frequency	Frequency (MHz)	Spurious Emission		Limit (dBm)	Over Limit (dBm)	Result
		Polarization	Level(dBm)			
1GHz-6GHz	1256.36	Vertical	-48.55	-30	-18.55	Pass
	3012.52	Vertical	-46.67	-30	-16.67	Pass
	4585.58	Vertical	-45.22	-30	-15.22	Pass
	1405.69	Horizontal	-50.13	-30	-20.13	Pass
	3588.58	Horizontal	-52.22	-30	-22.22	Pass
	4899.69	Horizontal	-46.69	-30	-16.69	Pass

Remark: No any other emission level margin less than 10dB can be observed and be reported.

TX in standby Mode:

N/A: Not applicable, since the spurious emission of the EUT is too weak to be detected.(≤-80dBm)

j) Rx Unwanted emissions in the spurious domain

Test Frequency	Frequency (MHz)	Spurious Emission		Limit (dBm)	Over Limit (dBm)	Result
		Polarization	Level(dBm)			
30MHz-1GHz	63.092	Vertical	-77.82	-57.00	-20.82	Pass
	176.269	Vertical	-71.42	-57.00	-14.42	Pass
	333.687	Vertical	-70.77	-57.00	-13.77	Pass
	603.539	Vertical	-63.29	-57.00	-6.29	Pass
	869.130	Vertical	-59.16	-57.00	-2.16	Pass
	982.620	Vertical	-60.85	-57.00	-3.85	Pass
	46.995	Horizontal	-70.59	-57.00	-13.59	Pass
	279.044	Horizontal	-67.77	-57.00	-10.77	Pass
	477.169	Horizontal	-63.12	-57.00	-6.12	Pass
	721.726	Horizontal	-60.32	-57.00	-3.32	Pass
	906.482	Horizontal	-58.33	-57.00	-1.33	Pass
	932.272	Horizontal	-57.71	-57.00	-0.71	Pass

Test Frequency	Frequency (MHz)	Spurious Emission		Limit (dBm)	Over Limit (dBm)	Result
		Polarization	Level(dBm)			
1GHz-6GHz	1622.52	Vertical	-56.36	-47	-9.36	Pass
	2646.99	Vertical	-58.75	-47	-11.75	Pass
	4215.28	Vertical	-55.92	-47	-8.92	Pass
	1855.42	Horizontal	-62.15	-47	-15.15	Pass
	2996.66	Horizontal	-57.22	-47	-10.22	Pass
	4378.45	Horizontal	-56.28	-47	-9.28	Pass

Remark: No any other emission level margin less than 10dB can be observed and be reported.

- End of the Report -