Straubing, March 30, 1999

T E S T - R E P O R T

No. 56404-90446

for

HSC-1632

Wireless Magnetic Sensor

Applicant:	Huge Automations Co., Ltd.
Purpose of testing:	To show compliance with FCC Code of Federal Regulations, Part 15 Subpart C, Section §15.231

Table of Contents

1. Administrative Data

Equipment Under Test (EUT):	HSC-1632
Type of equipment:	Wireless Magnetic Sensor
Parts/accessories:	---
Serial number:	
Version of EUT:	
FCC-ID:	K5IHSC1632

Applicant:	Huge Automations Co., Ltd.
(full address)	No. 35, Lane 36, Ding-Gin Rd., Sanmin Dist., Kaohsiung City, Taiwan, R.O.C.
Contract identification:	N/A
Contact person:	Mr. Paul Chen
Manufacturer:	N/A

Receipt of EUT:	July 08, 1999
Date of test:	August 1999

Responsible for testing:	Mr. Johann Roidt
Responsible for test report:	Mr. Johann Roidt

2. Summary of Test Results

The tested sample fully complies with the requirements for intentional radiators set forth in the

Code of Federal Regulations CFR 47
Part 15 Subpart C, Section §15.231
of the
Federal Communication Commission (FCC).

Johann Roidt
Technical Manager

3. Operation Mode of EUT

Transmitter in non-conductive test fixture which allows continous operation of the transmitter.

4. Changes made to the EUT during this certification test

No changes have been made to the EUT during this certification test.

5. Configuration of EUT and Peripheral Devices

Configuration of cables of EUT

Not applicable

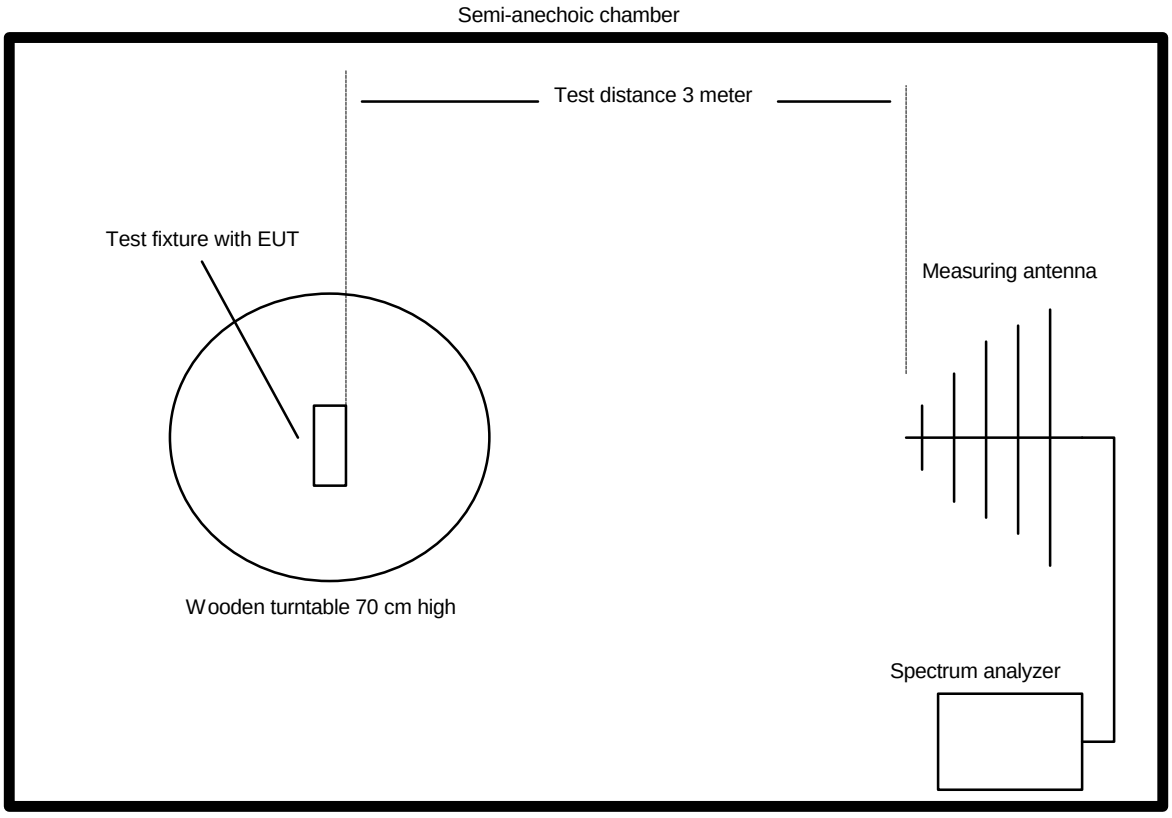
Configuration of peripheral devices connected to EUT

Not applicable

6. Measuring Methods

6.1. Transmitter Parameter Tests (§ 15.249 (a)).

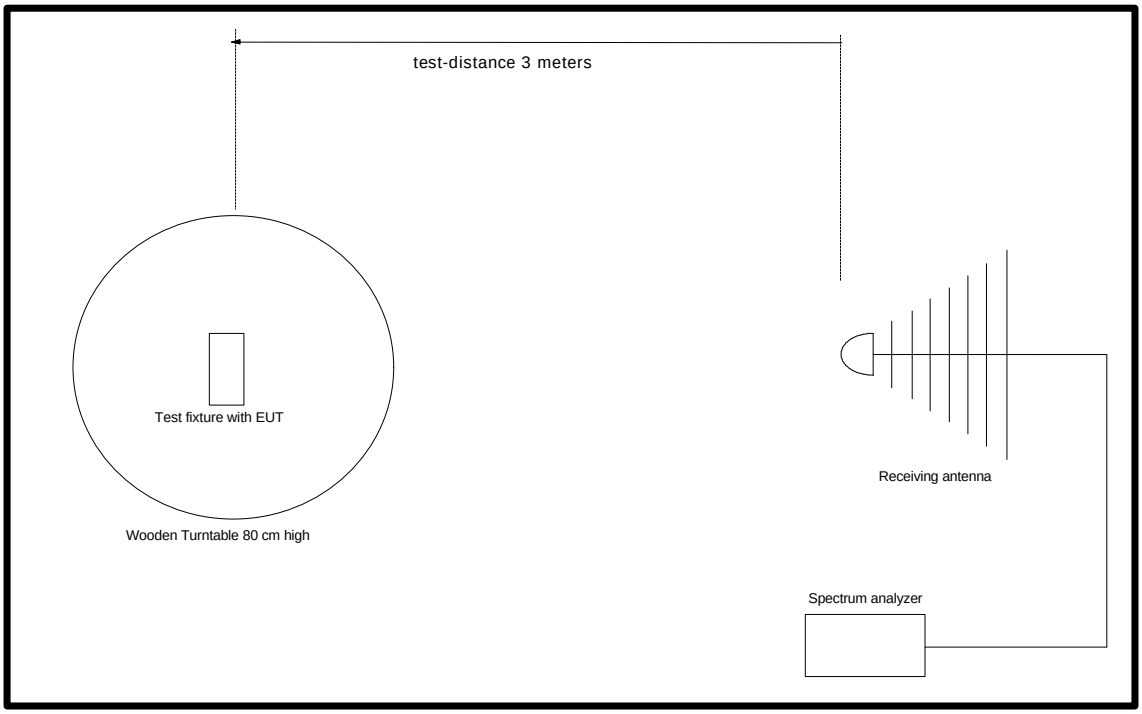
All transmitter parameter tests were performed at a test-distance of 3 meters in a semi-anechoic room (radiated). During the tests the EUT was rotated all around and the receiving-antenna was raised and lowered from 1 meter to 4 meters to find the maximum levels of emissions. Cables and equipment were placed and moved within the range of position likely to find their maximum emissions. Measurements were made in horizontal and vertical polarization.
EUT was operating in transmit mode at the appropriate frequency with its internal modulation.
The bandwidth of the emission was measured with a spectrum analyzer. Resolution (RBW) and video bandwidth (VBW) were set to 10 kHz (RBW and VBW)



Test equipment used (see equipment list for details:
02, 08, 10, 40, 61, 64

6.2. Radiated Emissions 30 MHz - 1 GHz (§15.209, §15.231)

Radiated emissions were measured over the frequency range from 30 MHz to 1 GHz. The bandwidth of the EMI-receiver was set to 100 kHz and the detector-function was set to CISPR quasi-peak.
The test setup was made in accordance with ANSI C63.4-1992. Measurements were made in horizontal and vertical polarization. Preliminary scans were taken in a semi-anechoic room using a spectrum analyzer with the detector function set to peak. All tests were performed at a test-distance of 3 meters. For final testing an open-area test-site was used. During the tests the EUT was rotated all around and the receiving-antenna was raised and lowered from 1 meter to 4 meters to find the maximum levels of emissions. Cables and equipment were placed and moved within the range of position likely to find their maximum emissions.

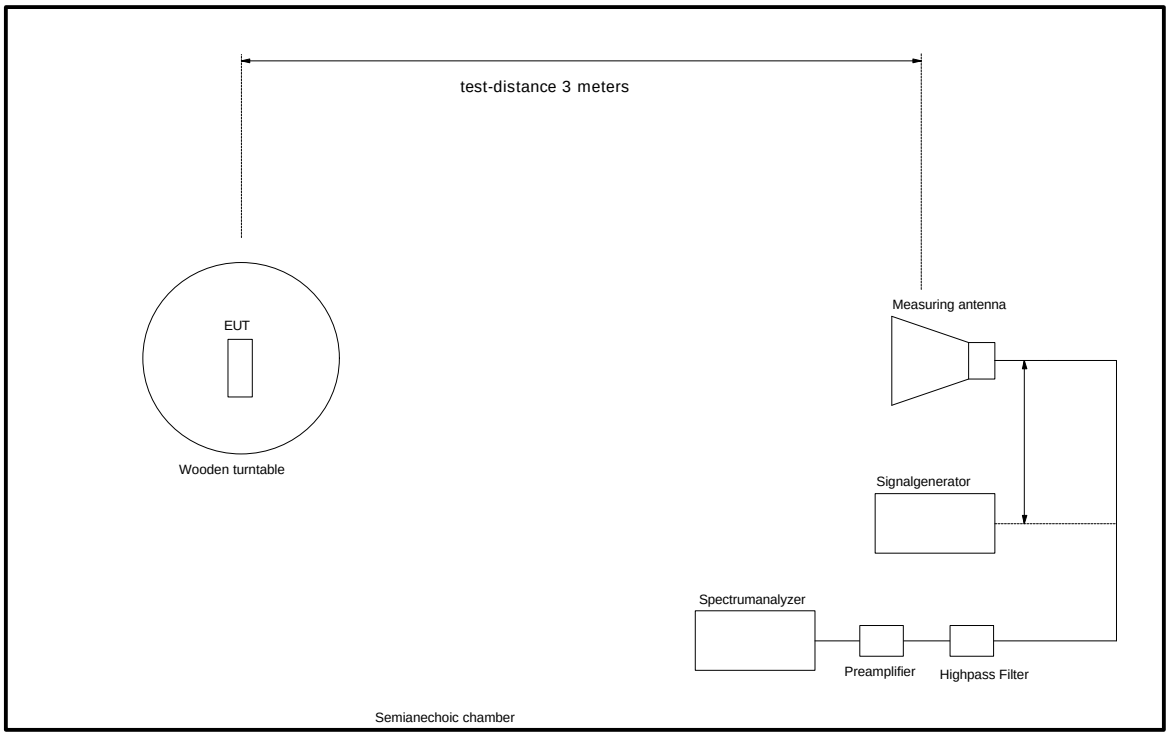


Test equipment used (see equipment list for details:
01, 05, 12, 38, 39, 40, 41, 58, 61, 64, 66

6.3. Radiated Emissions above 1 GHz

Radiated emissions were measured in the frequency range 1 GHz to 3.15 GHz in transmit mode .The resolution bandwidth and the video bandwidth of the spectrum analyzer was set to 1 MHz. Prescans with video bandwidth 1 MHz (peak mode) were taken to check out the highest levels (with reference to the limits), see 6.4 for details to prescan procedure. Final measurements were performed at the three highest emissions per band. EUT was rotated all around and receiving antenna was raised and lowered to find the maximum levels of emission. Cables and equipment were placed and moved within the range of position likely to find their maximum emissions. Measurements were made in horizontal and vertical polarization.
All tests were performed in a semi-anechoic chamber with a test-distance of 3 meters.
To avoid overload in transmit mode a high pass filter was connected to the input of the preamplifier (in case when a preamplifier was necessary)). In this case a signal generator was used for substitution to eliminate the influence of filter and preamplifier.
Substitution was performed in the following steps:

- antenna cable was disconnected from receiving antenna and connected to signal generator output
- level of signal generator was increased until the reading value of the analyzer was the same as caused by EUT
- level of signal generator was noted
- final value was calculated by converting the signal generator level to dBµV/m and adding the antenna correction factor.



Test equipment used (see equipment list for details:
02, 13, 14, 16, 42, 46, 47, 57, 64, 67

6.4. Procedure for Preliminary Radiated Emission Tests

The procedure for preliminary radiated emission tests follows section 13.4.1 of ANSI C63.4-1992.
The EUT is a hand-held remote control transmitter with integral antenna, internal modulation only, battery supply and no cables to be connected. Therfore the prescanning procedure is as follows:

Prescans are made in the frequency ranges:

30 - 230 MHz
230 -1000 MHz
1000-5000 MHz

with the receiving antenna set to horizontal and vertical polarization.

The following step-by-step procedure will be used:

1) Monitor the frequency range at a fixed antenna height and and EUT azimuth
2) Rotate the EUT 360° to maximize the suspected highes azimuth signals. Note the amplitude and frequency of the signals. Orient the EUT azimuth for maximum emission.
3) Move the antenna over its full allowed range of travel to maximize the emission. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to step 2) with the antenna fixed at this height. Otherwise move the antenna to the height that repeats the highest amplitude observation and proceed.

4) Make a hardcopy of the spectrum.

5) Repeat steps 1 through 4 for the other orthogonal axes of the EUT.

6) Repeat steps 1 through 5 for orthogonal antenna polarisation

6.5. Method for comparing spectrum analyzer output to the limit

The following procedure will be used:

1) Maximize the emission according to 6.4.

2) Set the spectrum analyzer to **Max Hold**

3) Wait until the noise is fully maximized.

4) Put the **marker** on top of the investigated signal

5) Note frequency and level of the investigated signal

6.6. Spectrum analyzer settings for final test

Frequency range	Detector	Resolution Bandwidth	Video Bandwidth	Trace Mode
30 - 1000 MHz	Quasi Peak	100 kHz	1 MHz	Max Hold
> 1000 MHz	Peak	1 MHz	1 MHz	Max Hold

7. Photographs Taken During Testing

EUT in normal position

8. List of Measurements

FCC Part 15 Subpart C			
Section(s):	**Test**	**Page**	**Result**
	Transmit mode (TX):		
§15.231 (b)	Field strength of emissions (fundamental and harmonics)		passed
§15.231 (c)	Bandwidth of the emission		passed

9. Test Results

Field Strength of Emissions according to FCC Rules, Part 15, Subpart C, Section 15.231

Model: HSC-1632
Type: Wireless Magnetic Sensor
Serial No.:
Applicant: Huge Automations Co. Ltd.

Test Site: Open Field Test Site (< 1GHz)
Semi-anechoic chamber (>1GHz)
Distance: 3 Meter
Date of test: August, 1999

Frequency (MHz)	Detector	Antenna Polarization	Analyzer Reading (dBµV)	Correction Factor (dB)	Field Strength (dBµV/m)
433.92	Peak	Horizontal	53.5	26.0	**79.5**
867.8	Peak	Horizontal	21.3	34.0	**55.3**
1302.2	Peak	Horizontal	1.22	29.5	**30.72**
1737.7	Peak	Vertical	3.50	31.0	**34.50**

Sample calculation of field strength values:

Field Strength (dBµV/m) = Analyzer Reading (dBµV) + Correction Factor (dB)

Test equipment used (see equipment list for details:
02, 13, 14, 16, 38, 40 ,42, 57, 64, 67

Field Strength of Emissions according to FCC Rules, Part 15, Subpart C, Section 15.231 (b)

Calculation of final result using the duty cycle correction factor

Model: HSC-1632
Type: Wireless Magnetic Sensor
Serial No.:
Applicant: Huge Automation Co. Ltd.

Test Site: Open Field Test Site (< 1GHz)
Semi-anechoic chamber (>1GHz)
Distance: 3 Meter
Date of test: August,1999

Calculation of duty cycle correction factor:
Period of pulse train: --- ms
Length of pulse train: 106 ms
Width of pulses: either 0.36 or 0.68 ms

There are 37 pulses with 0.36 ms and 37 pulses with 0.680 ms witdth =
Sum of pulse widths = 38.48 ms
The duty cycle correction factor is:

Sum of pulse widths in one period divided by the length of one period
=
38.48 ms / 106 ms = 0.363 = 8.8 dB

Frequency (MHz)	Field Strength (dBµV/m)	Duty Cycle Correction Factor	Corrected Field Strength (dBµV/m)	Limit (dBµV/m)	Margin dB
433.92	**79.5**	-8.8	**70.7**	80.82	**10.82**
867.8	**55.3**	-8.8	**46.5**	60.82	**14.32**
1302.2	**30.72**	-8.8	**21.92**	60.82	**38.9**
1737.7	**34.50**	-8.8	**25.7**	60.82	**35.12**

Note:

Bandwidth of the Emission according to FCC Rules, Part 15, Subpart C, Section 15.231 (c)

Model: HSC-1631
Type: Wireless PIR Sensor
Serial No.: ---
Applicant: Huge Automations Co. Ltd.

Test Site: Open Field Test Site (< 1GHz)
Semi-anechoic chamber (>1GHz)
Distance: 3 Meter
Date of test: August,1999

Lower Frequency at –20 dBc	433.5511 MHz
Upper Frequency at –20 dBc	433.9644 MHz
Calculated Bandwidth of the emission	**0.4133 MHz = 0.095 %**

10. Equipment List

To facilitate reference to test equipment used for related tests, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory.

No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	R 3261 A	91720155	Advantest
02	Spectrum Analyzer	R 3271	05050023	Advantest
03	Test Receiver	ESH 3	880112/032	Rohde & Schwarz
04	Test Receiver	ESHS 10	860043/016	Rohde & Schwarz
05	Test Receiver	ESV	881414/009	Rohde & Schwarz
06	Test Receiver	ESVP	881120/024	Rohde & Schwarz
07	Audio Analyzer	UPA	862954	Rohde & Schwarz
08	Power Meter	NRVS	836856/015	Rohde & Schwarz
09	Power Sensor	NRV-Z52	837901/030	Rohde & Schwarz
10	Power Sensor	NRV-Z4	863828/015	Rohde & Schwarz
11	Preamplifier	ESV-Z3	860907/004	Rohde & Schwarz
12	Preamplifier	R14601		Advantest
13	Preamplifier	ACX/080-3030	32640	CTT
14	Preamplifier	ACO/180-3530	32641	CTT
15	Signal Generator	SMS	872166/039	Rohde & Schwarz
16	Signal Generator	HP 8673 D	2930A00966	Hewlett Packard
17	Waveform Generator	HP 33120 A	US34005375	Hewlett Packard
18	UHF Attenuator Set	DPU	300771/075	Rohde & Schwarz
19	UHF Attenuator Set	DPU	300788/006	Rohde & Schwarz
20	Pulse Limiter	ESH 3-Z2	1144	Rohde & Schwarz
21	Pulse Limiter	11947 A	3107A00566	Hewlett Packard
22	V-Network	ESH 3-Z5	862770/018	Rohde & Schwarz
23	V-Network	ESH 3-Z5	894785/005	Rohde & Schwarz
24	V-Network	ESH 3-Z5	830952/025	Rohde & Schwarz
25	V-Network	ESH 3-Z6	830722/010	Rohde & Schwarz
26	V-Network	NSLK 8127	8127152	Schwarzbeck
27	V-Network	NNLA 8119	8119148	Schwarzbeck
28	V-Network	SE 01	01	Senton
29	T-Network	ESH 3-Z4	890602/011	Rohde & Schwarz
30	T-Network	ESH 3-Z4	890602/012	Rohde & Schwarz
31	High Impedance Probe	TK 9416	01	Schwarzbeck
32	High Impedance Probe	TK 9416	02	Schwarzbeck
33	Current Probe	ESH 2-Z1	863366/18	Rohde & Schwarz
34	Current Probe	ESV-Z1	862553/3	Rohde & Schwarz

No.	Type	Model	Serial Number	Manufacturer
35	Absorbing Clamp	MDS 21	80911	Lüthi
36	Absorbing Clamp	MDS 21	79690	Lüthi
37	Loop Antenna	HFH2-Z2	882964/1	Rohde & Schwarz
38	Biconical Antenna	HK 116	836239/02	Rohde & Schwarz
39	Biconical Antenna	BBA 9106	A0379 324	Schwarzbeck
40	Log. Periodic Antenna	HL 223	834408/12	Rohde & Schwarz
41	Log. Periodic Antenna	UHALP 9107	9107150	Schwarzbeck
42	Horn Antenna	3115	9508-4553	Emco
43	Horn Antenna	3160-03	9112-1003	Emco
44	Horn Antenna	3160-04	9112-1001	Emco
45	Horn Antenna	3160-05	9112-1001	Emco
46	Horn Antenna	3160-06	9112-1001	Emco
47	Horn Antenna	3160-07	9112-1008	Emco
48	Horn Antenna	3160-08	9112-1002	Emco
49	Horn Antenna	3160-09	9403-1025	Emco
50	Digital multimeter	199	463386	Keithley
51	DC Power Supply	NGSM 32/10	203	Rohde & Schwarz
52	DC Power Supply	NGB	2455	Rohde & Schwarz
53	DC Power Supply	NGA	386	Rohde & Schwarz
54	Temperature Test Chamber	HT4010	07065550	Heraeus
55	Cable	RG214	1309	Senton
56	Cable	150CM_001	1479	Rosenberger
57	Cable	150CM_002	1480	Rosenberger
58	Cable Set EG1	RG214	1189 - 1191	Senton
59	Cable Set Cabine 1	RG214		Senton
60	Cable Set Cabine 2	RG214		Senton
61	Cable Set Cabine 3	RG214		Senton
62	Shielded Room	Nr. 1	1451	Senton
63	Shielded Room	Nr. 2	1452	Senton
64	Semi-anechoic Chamber	Nr. 3	1453	Siemens
65	Shielded Room	Nr. 4	1454	Euroshield
66	Open Area Test Site	EG 1		Senton
67	High pass filter			AT & T

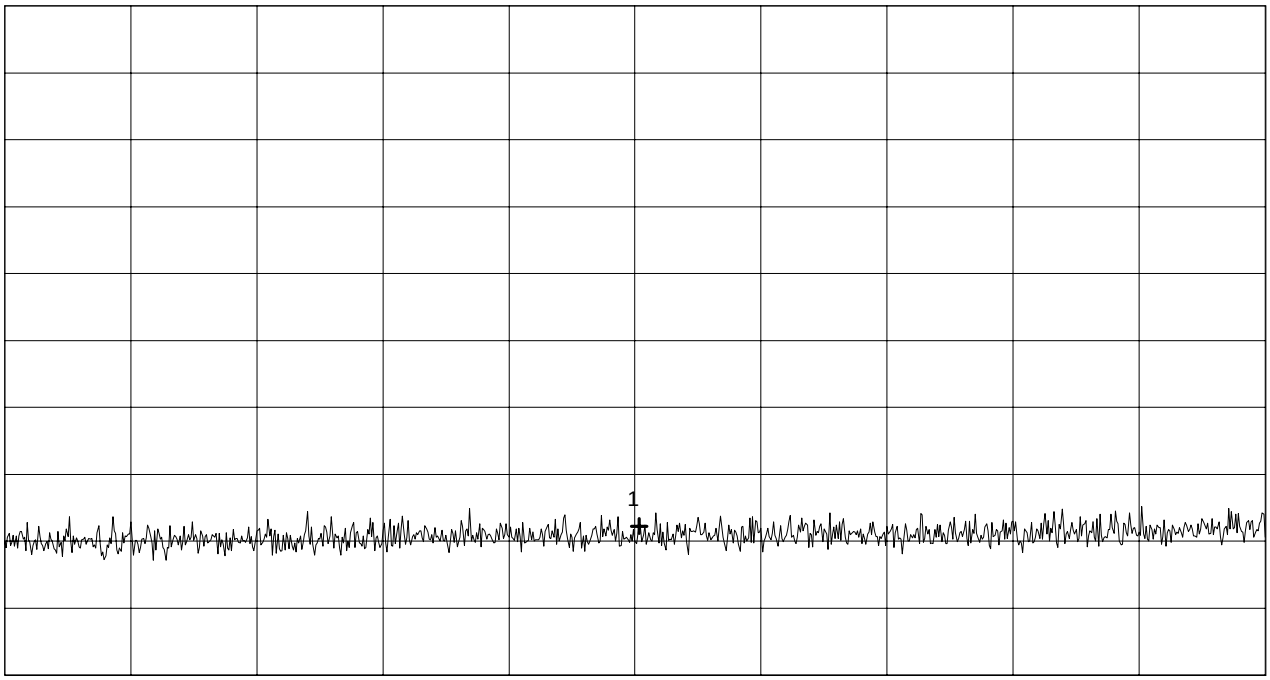
11. Charts Taken During Testing

Radiated Emission Measurment according to FCC Rules

Model: HSC 1631 Wireless PIR Sensor	Mode: Reasiated Measurement at 3 m Distance
Serial No.: ---	Horizontal Polarisation
Applicant: Huge Automations Co., Ltd.	EUT continously transmitting Normal operation position (upright)

Ref.Level 42 dBµV
5 dB dB/Div.

ATT 0 dB



Start 30.000 MHz
RBW 100 kHz

VBW 100 kHz

Stop 300.000 MHz
SWP 100 ms

**** Multi Marker ****

Nr.1	165.900000 MHz	3.13 dBµV
Nr.2		
Nr.3		
Nr.4		
Nr.5		
Nr.6		
Nr.7		
Nr.8		

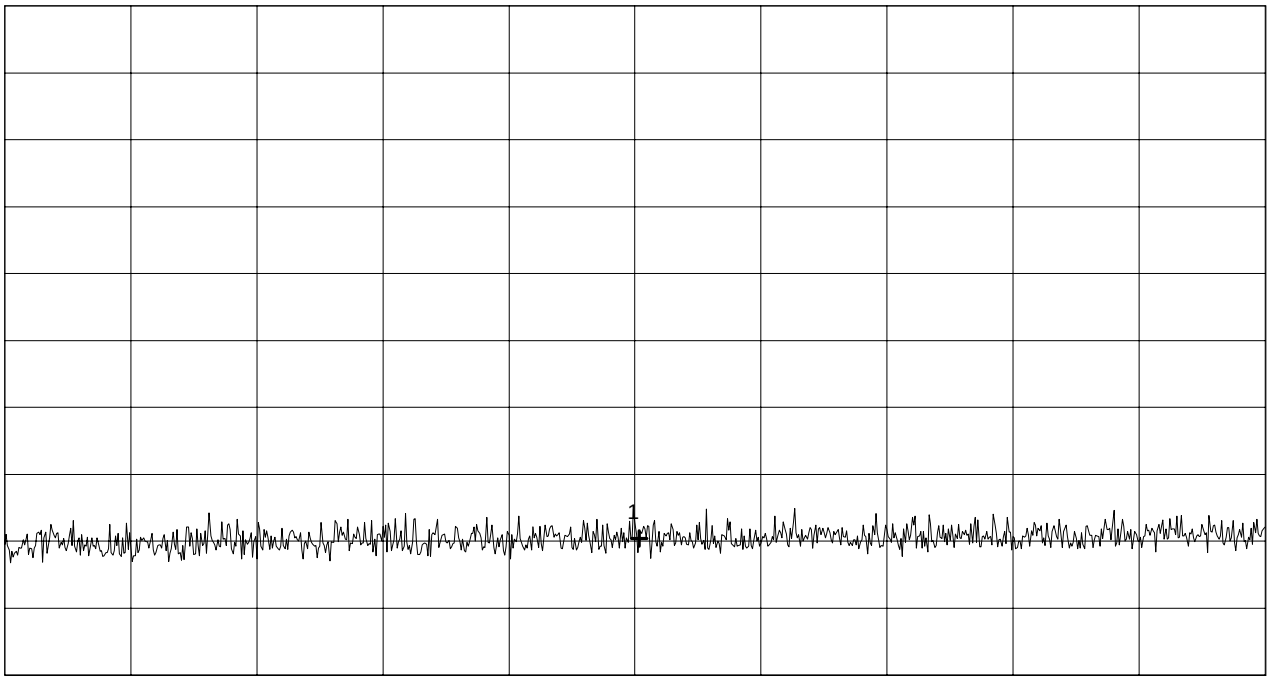
Tested by: Johann Roidt	Project-No.:
Date:	Page 24 of 30 Pages

Radiated Emission Measurment according to FCC Rules

Model: HSC 1631 Wireless PIR Sensor	Mode: Radiated Measurement at 3 m Distance Vertical Polarisation EUT continously transmitting Normal operation position (upright)
Serial No.: ---	
Applicant: Huge Automations Co., Ltd.	

Ref.Level 42 dBµV
5 dB dB/Div.

ATT 0 dB



Start 30.000 MHz
RBW 100 kHz

VBW 100 kHz

Stop 300.000 MHz
SWP 100 ms

**** Multi Marker ****

Nr.1	165.900000 MHz	2.20 dBµV
Nr.2		
Nr.3		
Nr.4		
Nr.5		
Nr.6		
Nr.7		
Nr.8		

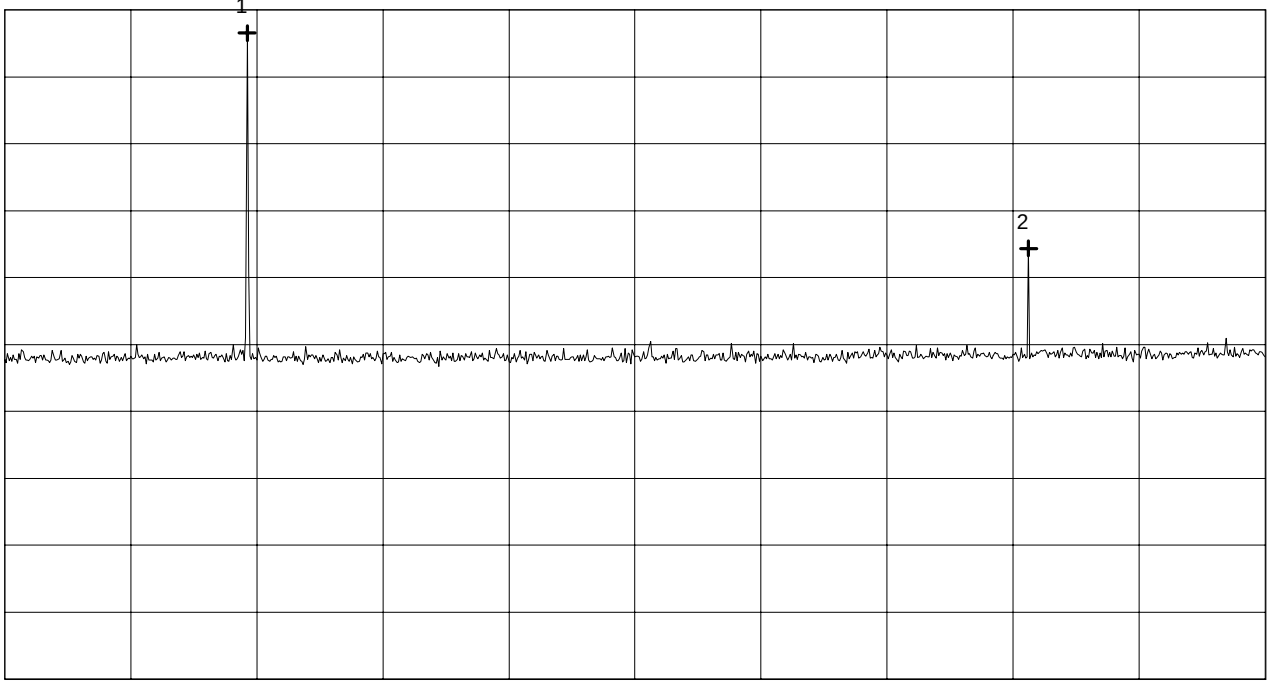
Tested by: Johann Roidt	Project-No.:
Date:	Page 25 of 30 Pages

Radiated Emission Measurment according to FCC Rules

Model: HSC 1631 Wireless PIR Sensor	Mode: Radiated Measurement at 3 m Distance Horizontal Polarisation EUT continously transmitting Normal operation position (upright)
Serial No.: ---	
Applicant: Huge Automations Co., Ltd.	

Ref.Level 57 dBµV
10 dB dB/Div.

ATT 0 dB



Start 300.000 MHz
RBW 100 kHz

VBW 100 kHz

Stop 1.000 GHz
SWP 220 ms

**** Multi Marker ****

Nr.1	434.555556 MHz	53.53 dBµV
Nr.2	868.555556 MHz	21.33 dBµV
Nr.3		
Nr.4		
Nr.5		
Nr.6		
Nr.7		
Nr.8		

Tested by: Johann Roidt	Project-No.:
Date:	

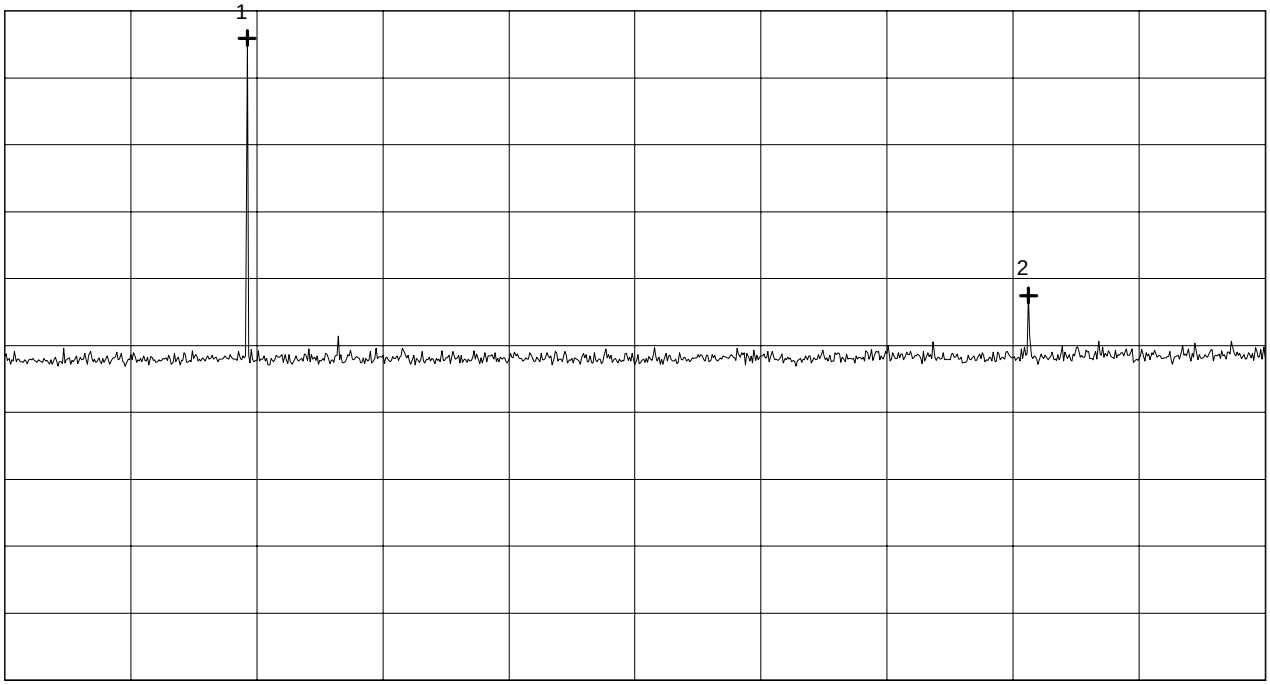
Senton GmbH / EMV-Prüfzentrum / Äußere Frühlingstraße 45 / 94315 Straubing / Tel. 09421 55220

Radiated Emission Measurment according to FCC Rules

Model: HSC 1631 Wireless PIR Sensor	Mode: Radiated Measurement at 3 m Distance Vertical Polarisation EUT continously transmitting Normal operation position (upright)
Serial No.: ---	
Applicant: Huge Automations Co., Ltd.	

Ref.Level 57 dBµV
10 dB dB/Div.

ATT 0 dB



Start 300.000 MHz
RBW 100 kHz

VBW 100 kHz

Stop 1.000 GHz
SWP 220 ms

**** Multi Marker ****

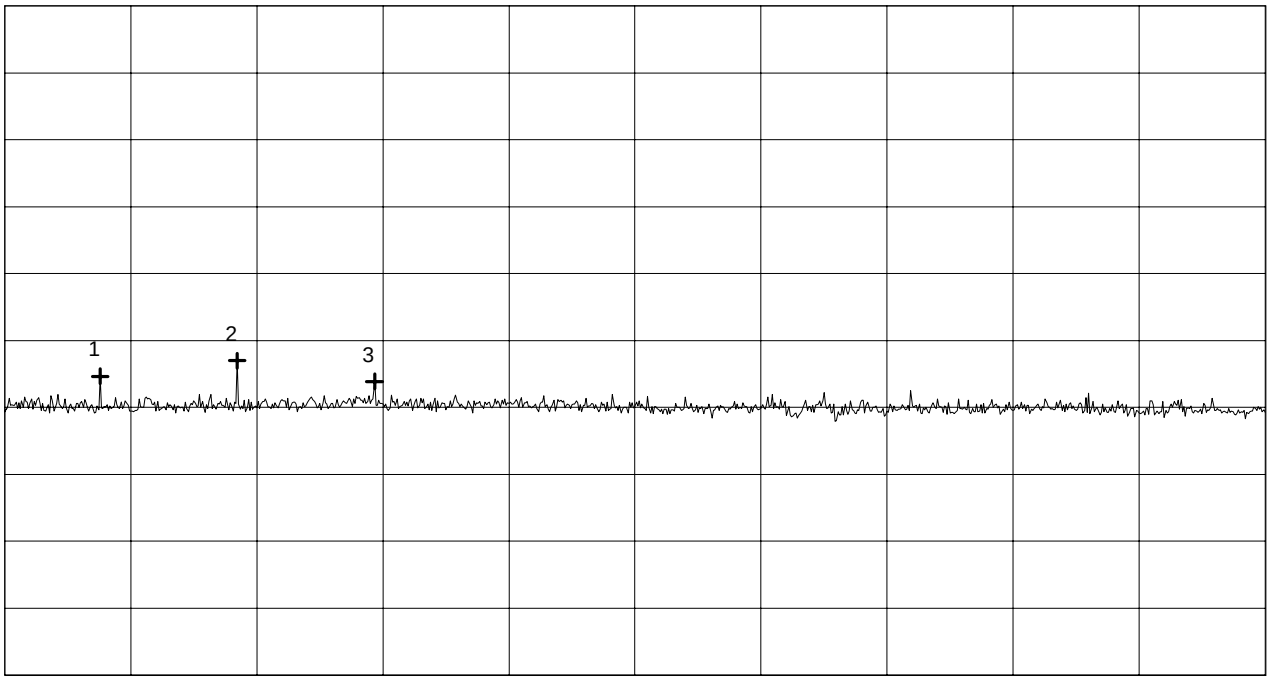
Nr.1	434.555556 MHz	52.92 dBµV
Nr.2	868.555556 MHz	14.47 dBµV
Nr.3		
Nr.4		
Nr.5		
Nr.6		
Nr.7		
Nr.8		

Tested by: Johann Roidt	Project-No.:
Date:	

Radiated Emission Measurment according to FCC Rules

Model: HSC 1631 Wireless PIR Sensor	Mode: Radiated Measurement at 3 m Distance Horizontal Polarisation EUT continously transmitting Normal operation position (upright)
Serial No.: ---	
Applicant: Huge Automations Co., Ltd.	

Ref.Level 56.5 dBµV ATT 0 dB Ref. Offset -30.5 dB
10 dB dB/Div.



Start 1.000 GHz Stop 5.000 GHz
RBW 100 kHz VBW 100 kHz SWP 1.20 s

**** Multi Marker ****

Nr.1	1.302222 GHz	1.15 dBµV
Nr.2	1.737778 GHz	3.46 dBµV
Nr.3	2.173333 GHz	0.36 dBµV
Nr.4		
Nr.5		
Nr.6		
Nr.7		
Nr.8		

Tested by: Johann Roidt	Project-No.:
Date:	Page 28 of 30 Pages

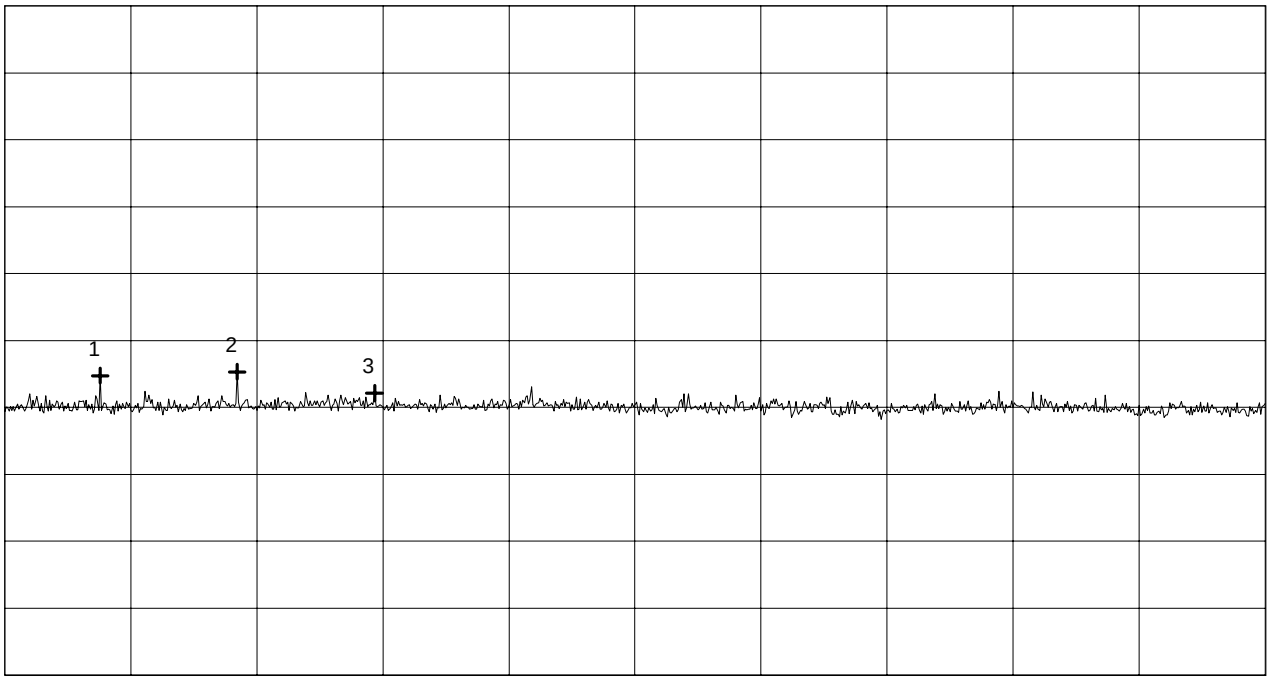
Radiated Emission Measurment according to FCC Rules

Model: HSC 1631 Wireless PIR Sensor	Mode: Radiated Measurement at 3 m Distance Vertical Polarisation EUT continously transmitting Normal operation position (upright)
Serial No.: ---	
Applicant: Huge Automations Co., Ltd.	

Ref.Level 56.5 dBµV
10 dB dB/Div.

ATT 0 dB

Ref. Offset -30.5 dB



Start 1.000 GHz
RBW 100 kHz

VBW 100 kHz

Stop 5.000 GHz
SWP 1.20 s

**** Multi Marker ****

Nr.1	1.302222 GHz	1.22 dBµV
Nr.2	1.737778 GHz	1.83 dBµV
Nr.3	2.173333 GHz	-1.37 dBµV
Nr.4		
Nr.5		
Nr.6		
Nr.7		
Nr.8		

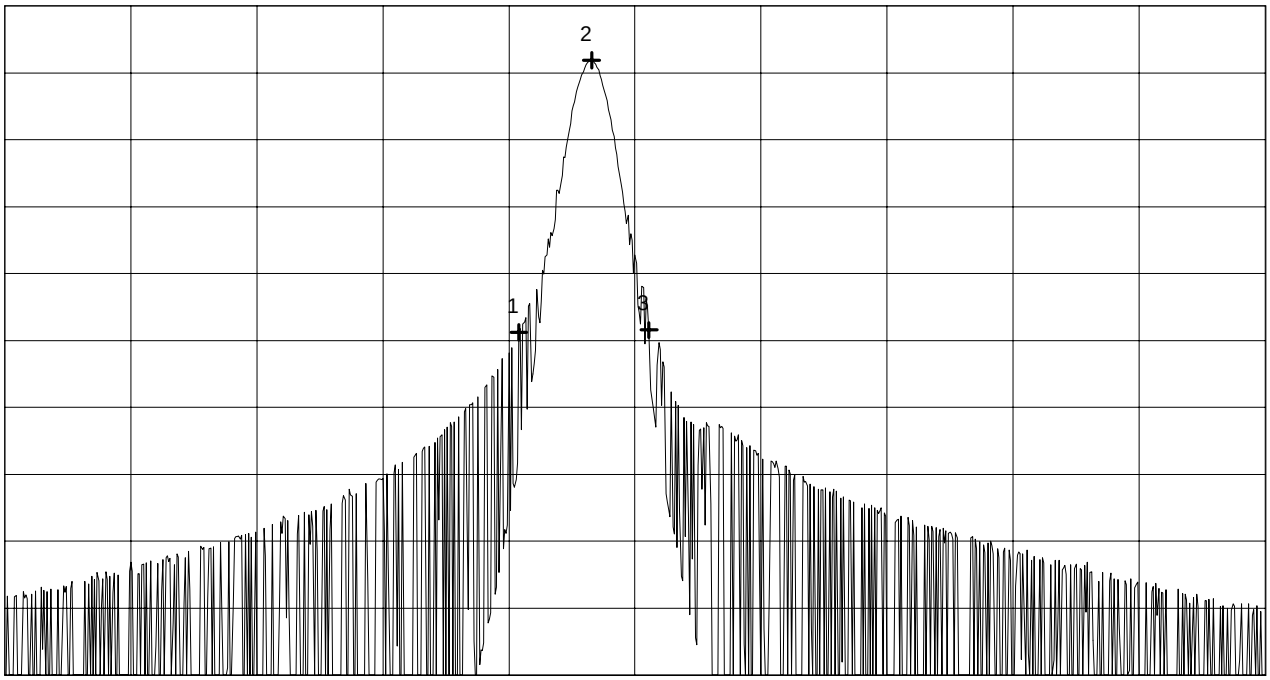
Tested by: Johann Roidt	Project-No.:
Date:	

Bandwidth of the Emission according to FCC Rules 15.231 (c)

Model: HSC-1631 Wireless PIR Sensor	Mode: The bandwidth of the emission at -20 dBc is: 0.4133 MHz = 0.095 %
Serial No.: ---	
Applicant: Huge Automations Co., Ltd.	

Ref.Level -14.1 dBm
5 dB dB/Div.

ATT 20 dB



Start 431.920 MHz
RBW 100 kHz

VBW 100 kHz

Stop 435.920 MHz
SWP 20 ms

**** Multi Marker ****

Nr.1	433.551111 MHz	-38.49 dBm
Nr.2	433.782222 MHz	-18.16 dBm
Nr.3	433.964444 MHz	-38.32 dBm
Nr.4		
Nr.5		
Nr.6		
Nr.7		
Nr.8		

Tested by: Johann Roidt	Project-No.: 56404-90450
Date:	Page 30 of 30 Pages