RF TEST REPORT

Report No.: Q191029S006-FCC-R

Supersede Report No.: N/A

Applicant	X-Sense Innovations Co., Ltd.
Product Name	Wireless Doorbell
Model No.	NV004BB
Serial Model No.	NV004BW, NV004CB, NV004CW, NV004DB, NV004DW, NV004EB, NV004EW, DB-B
Test Standard	FCC Part 15.231, ANSI C63.10:2013
Test Date	Nov. 13 to Dec. 22, 2019
Issue Date	Feb. 24, 2020
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐
Aaron Liang	David Huang
Aaron Liang Test Engineer	David Huang Checked By

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Test result presented in this test report is applicable to the tested sample only

Issued by:

BUREAU VERITAS (SHENZHEN) CONSUMER PRODUCTS SERVICES CO., LTD

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao'an District, Shenzhen, Guangdong China 518108

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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
Q191029S006-FCC-R	NONE	Original	Feb. 24, 2020

2. Customer information

Applicant Name	X-Sense Innovations Co., Ltd.
Applicant Add	B4-503-D,Tower B, Kexing Science Park, No.15 Keyuan Road, Technology Park Community,Yuehai Avenue,Nanshan District, Shenzhen
Manufacturer	X-Sense Technology Co., Ltd.
Manufacturer Add	Room 801, Tower B, Qiaode Technology Park, No. 7 Road, West Zone of High-Tech Park, Tianliao Community, Yutang Avenue, Guangming District, Shenzhen

3. Test site information

Lab performing tests	BUREAU VERITAS (SHENZHEN) CONSUMER PRODUCTS SERVICES CO., LTD
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao'an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

4. Equipment under Test (EUT) Information

Description of EUT:	Wireless Doorbell
Main Model:	NV004BB
Serial Model:	NV004BW, NV004CB, NV004CW, NV004DB, NV004DW, NV004EB, NV004EW, DB-B
Date EUT received:	Nov. 12, 2019
Test Date(s):	Nov. 13 to Dec. 22, 2019
RF Operating Frequency (ies):	433.92MHz(TX/RX)
Number of Channels :	1CH
Equipment Category:	DSC
Antenna Gain:	0dBi
Input Power:	Adapter: INPUT: AC 220V Battery: DC 3V
Trade Name :	N/A
FCC ID:	2AU4DDBB
Port:	Pls refer to user's manual
Type of Modulation:	FSK

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

Test Results Summary

Test Standard CFR 47 Part 15.231: 2014	Description	Pass / Fail
15.203	Antenna Requirement	Pass
15.207	Conducted Emissions Voltage	N/A
15.231(a)	Fundamental & Radiated Spurious Emission	Pass
15.231(c)	20dB Bandwidth	Pass
15.231(a)	Deactivation	Pass
ANSI C63.10:2013 PS: All measurement uncertainties are not taken into consideration for all presented test result.		

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

6.1 Antenna Requirement

Requirement(s): 47 CFR §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna requirement must meet at least one of the following:

a) Antenna must be permanently attached to the device.

b) Antenna must use a unique type of connector to attach to the device.

c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

Test result: Pass

The antenna is permanently attached to the device which meets the requirement.

6.2 Conducted Emissions Voltage

Temperature	26℃
Relative Humidity	36%
Atmospheric Pressure	1013mbar
Test date :	Dec. 23, 2019
Tested By :	Aaron Liang

Requirement:

Frequency of emission (MHz)	Conducted limit (dBμ V)	
	Quasi-peak	Average
0.15– 0.5	66 to 56*	56 to 46*
0.5– 5	56	46
5– 30	60	50

*Decreases with the logarithm of the frequency.

Procedures:

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.

Test result: N/A (Batteries operated)

6.3 20dB Occupied Bandwidth

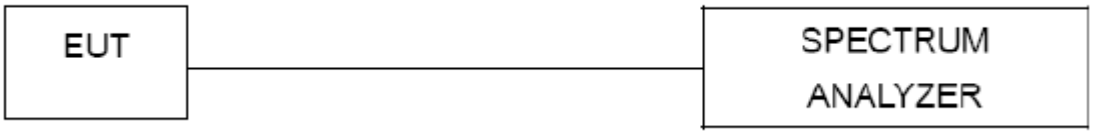
Temperature	26℃
Relative Humidity	36%
Atmospheric Pressure	1013mbar
Test date :	Dec. 23, 2019
Tested By :	Aaron Liang

Test Procedure:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Limit: 433.92MHz*0.25%= 1084.80 KHz

Test Setup:

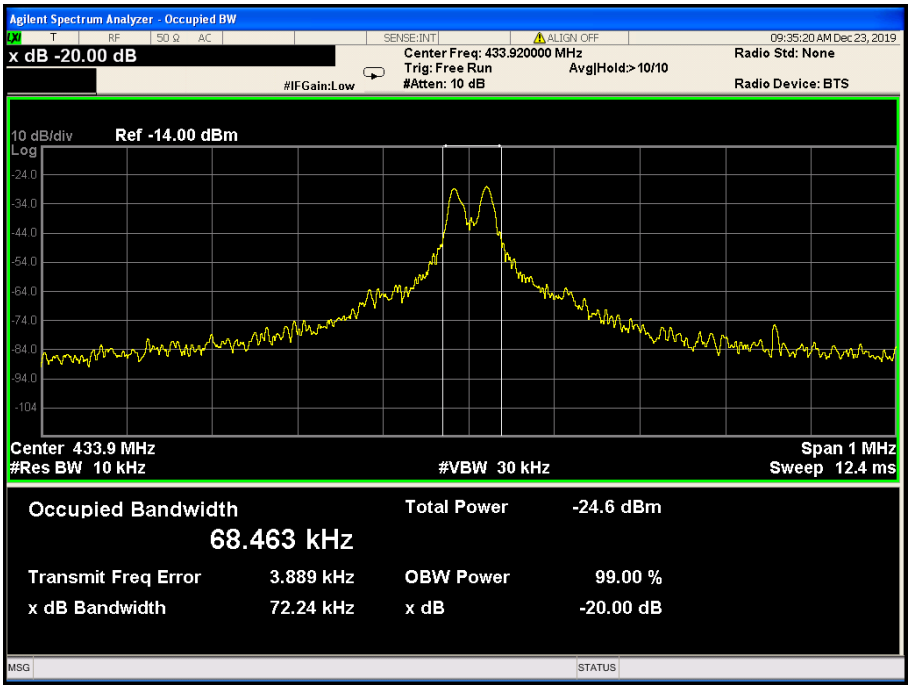


Test Result: Pass

Test Result:

Fundamental Frequency (MHz)	Measured 20dB Bandwidth (kHz)	FCC 15.231 Limit (kHz)	Result
433.92	72.24	1084.80	Pass

433.92 MHz



6.4 Radiated Fundamental and Spurious Emission

Temperature	25℃
Relative Humidity	45%
Atmospheric Pressure	1012mbar
Test date :	Feb. 24, 2020
Tested By :	Aaron Liang

Test Procedure:

1. Radiated emissions were measured according to ANSI C63.4. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1meter above the ground from the center of the loop. The measuring bandwidth was set to 10kHz. All possible modes of operation were investigated. Only the worst case emissions measured, All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Sample Calculation: Corrected Amplitude=Raw Amplitude(dBuV/m)+ACF(dB)+Cable Loss(dB)-Distance Correction Factor.

   Sample Calculation:

   1) Corrected Amplitude= Raw Amplitude(dBuV/m)+ACF(dB)+Cable Loss(dB)-Distance Correction Factor

   2) Average = peak reading + 20log(duty cycle)
4. Radiated Emissions Measurement Uncertainty

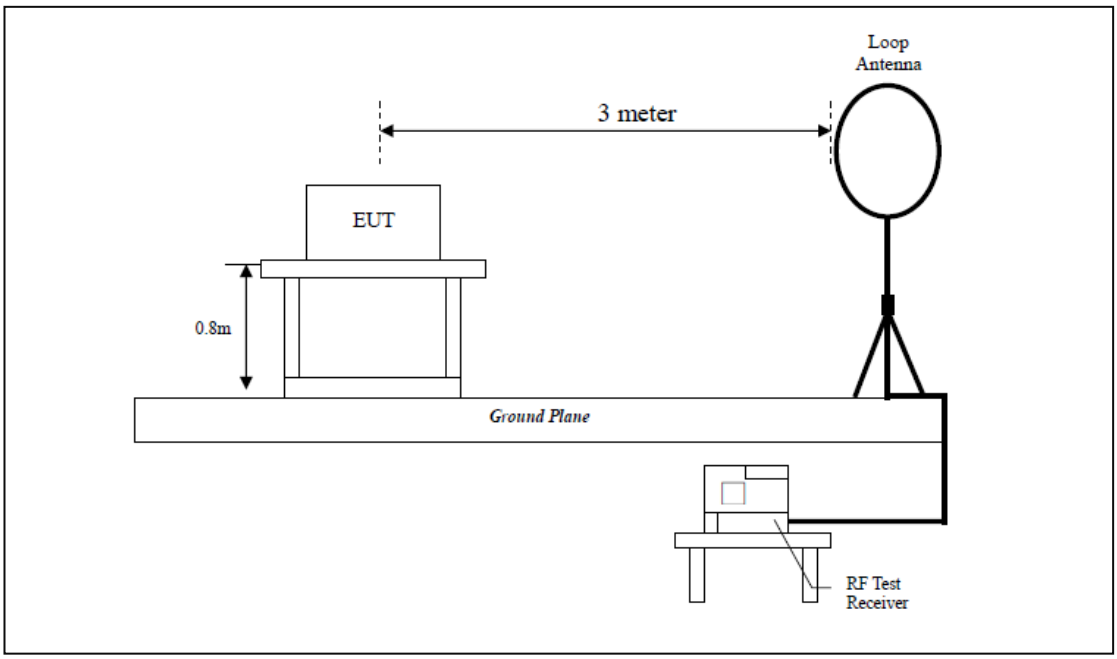
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz(QP only3m & 10m) is +5.6/-4.5dB(for EUTs<0.5m×0.5m×0.5m).In range of 1-40GHz) is ±3.6dB.

Standard Requirement:

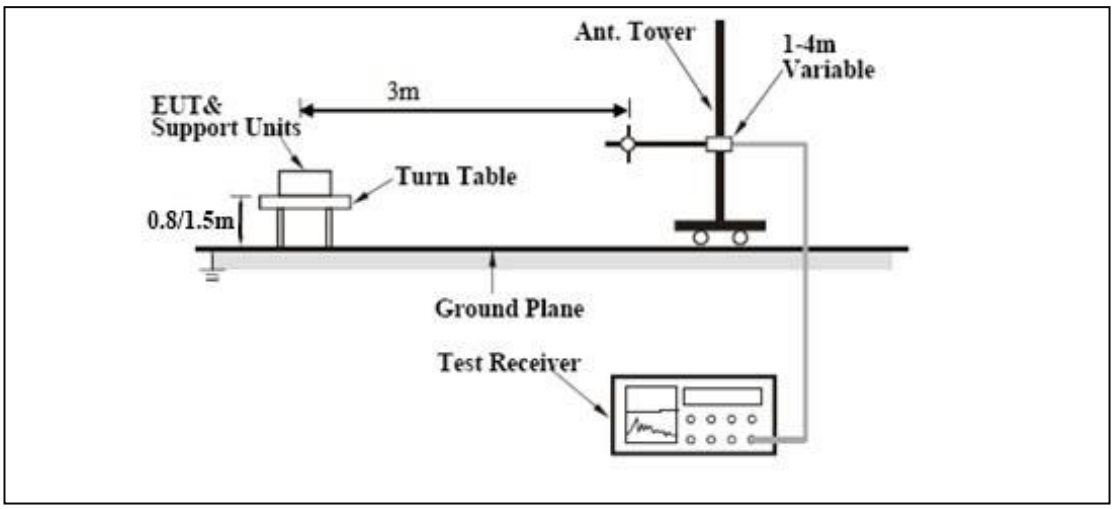
Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

Test Setup:

Radiated Emission Test-Up Frequency Below 30MHz



Radiated Emission Test-Up Frequency 30MHz~1GHz/Above 1GHz



Test Result: Pass

Test Result:

Test Mode:	Transmitting Mode

Frequency range: 9KHz - 30MHz

Freq. (MHz)	Detection value	Factor (dB/m)	Reading (dBuV/m)	Result (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)
--	--	--	--	--	--	>20
--	--	--	--	--	--	>20

Note:

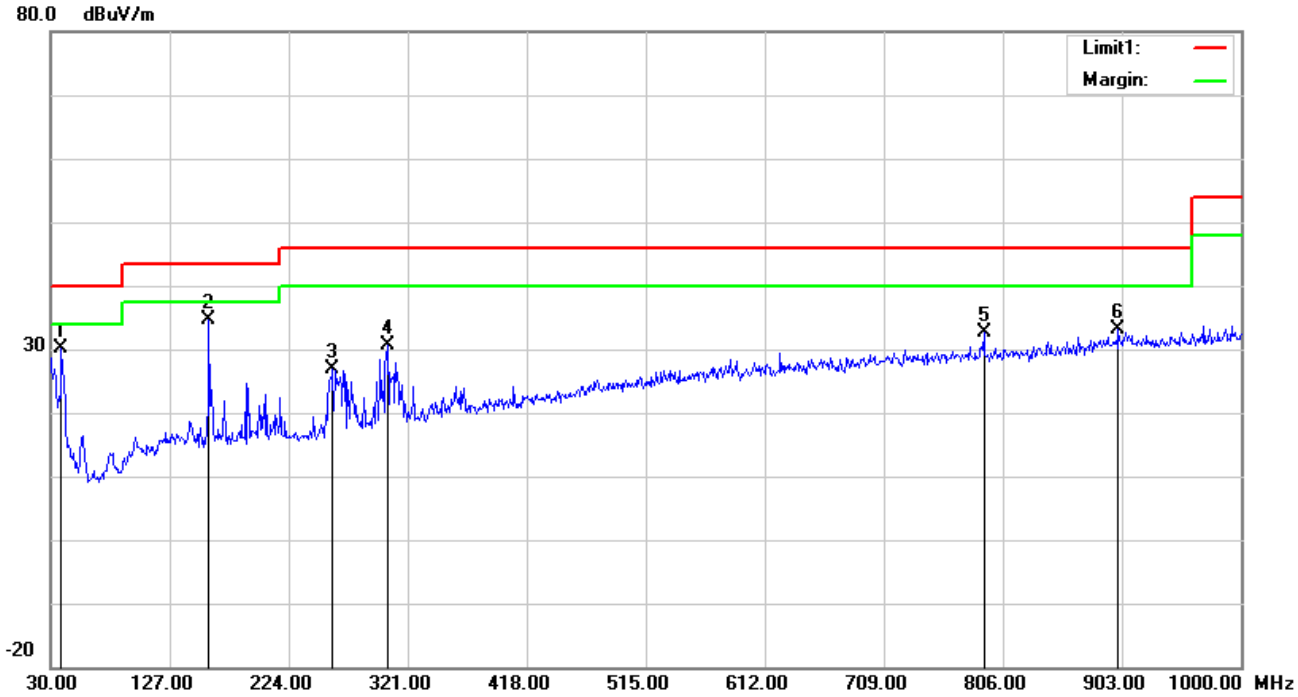
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Test Result:

30MHZ-1GHz

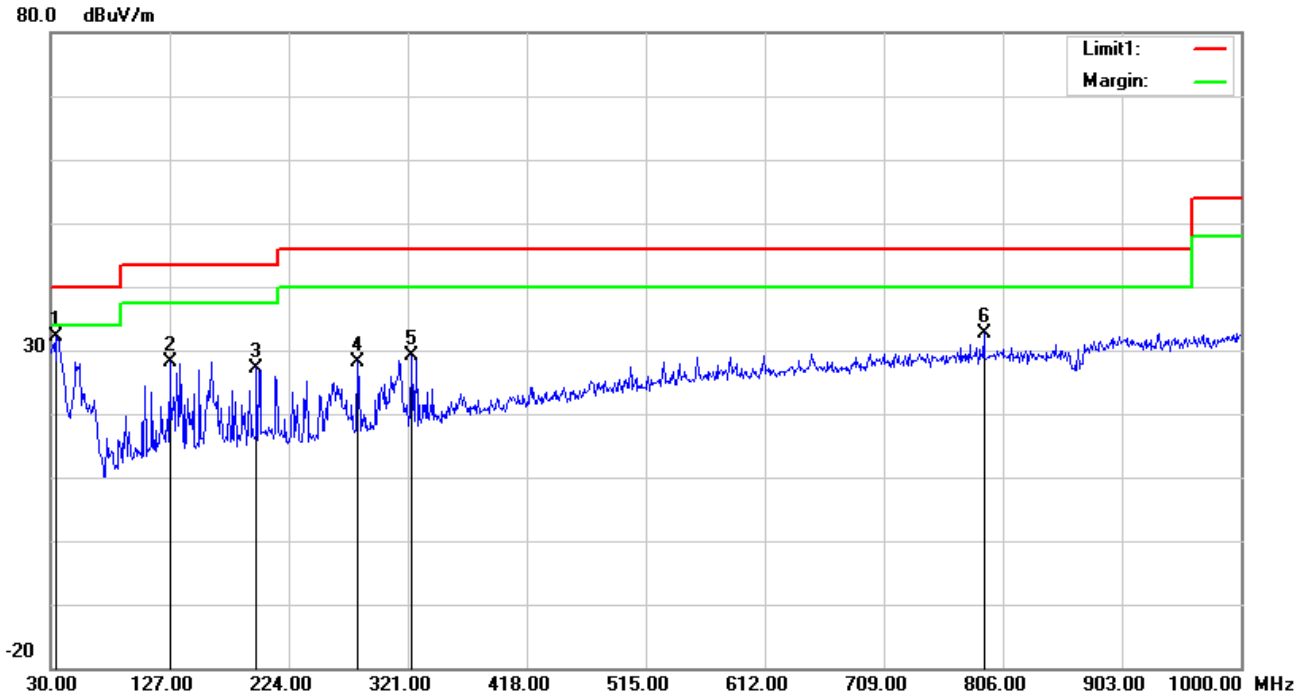


Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	H	38.7300	38.39	13.77	22.27	0.17	30.06	40.00	-9.94	100	176
2	H	159.0100	44.47	11.01	22.28	1.31	34.51	43.50	-8.99	100	61
3	H	259.8900	35.25	12.37	22.29	1.63	26.96	46.00	-19.04	100	292
4	H	304.5100	37.42	13.79	22.28	1.73	30.66	46.00	-15.34	100	131
5	H	790.4800	29.14	22.11	21.17	2.54	32.62	46.00	-13.38	100	345
6	H	900.0900	27.40	23.90	20.88	2.65	33.07	46.00	-12.93	100	331

30MHZ-1GHz



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	V	34.8500	37.27	17.00	22.25	0.15	32.17	40.00	-7.83	100	157
2	V	127.0000	37.71	11.64	22.38	1.04	28.01	43.50	-15.49	100	138
3	V	197.8100	36.61	11.47	22.37	1.54	27.25	43.50	-16.25	100	299
4	V	280.2600	35.39	13.23	22.29	1.68	28.01	46.00	-17.99	100	80
5	V	323.9100	35.31	14.18	22.22	1.78	29.05	46.00	-16.95	100	66
6	V	790.4800	29.07	22.11	21.17	2.54	32.55	46.00	-13.45	200	147

433 MHz

Frequency (MHz)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
433.93	H	85.12	72.43	100.83	80.83	-15.71	-8.4
869.6188	H	36.14	23.45	80.83	60.83	-44.69	-37.38
741.2	H	31.69	19	80.83	60.83	-49.14	-41.83
1301.79	H	46.58	33.89	74	54	-27.42	-20.11
3037.51	H	48.17	35.48	80.83	60.83	-32.66	-25.35
2603.58	H	49.52	36.83	80.83	60.83	-31.31	-24
433.93	V	92.46	79.77	100.83	80.83	-8.37	-1.06
869.1302	V	36.67	23.98	80.83	60.83	-44.16	-36.85
741.2	V	34.61	21.92	80.83	60.83	-46.22	-38.91
1301.79	V	43.67	30.98	74	54	-30.33	-23.02
3037.51	V	46.07	33.38	80.83	60.83	-34.76	-27.45
2603.58	V	51.61	38.92	80.83	60.83	-29.22	-21.91

Notes:

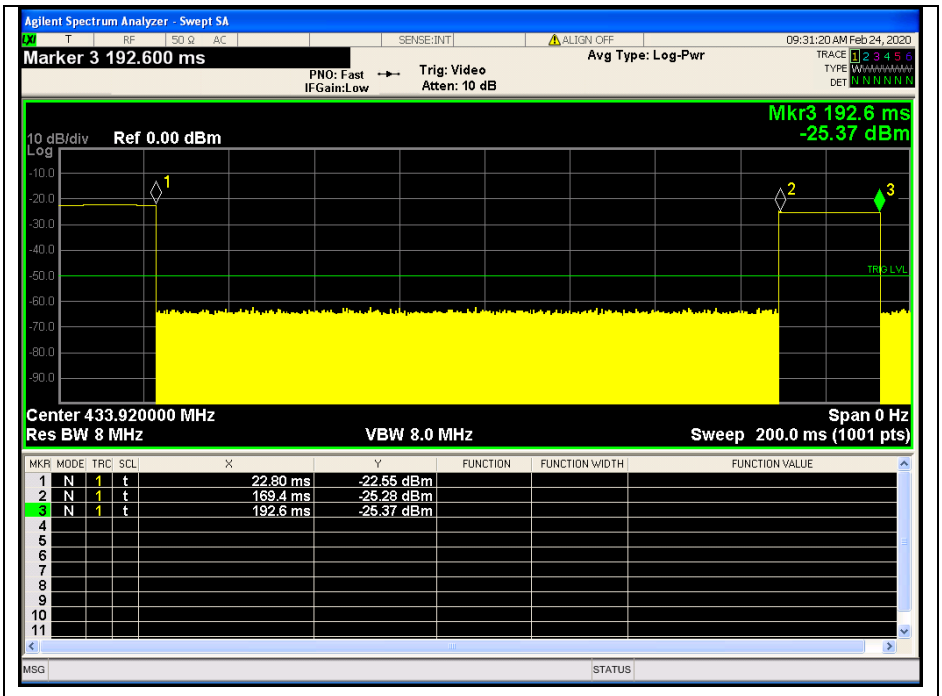
1. Duty cycle is 23.20%, 20log (duty cycle) = -12.69dB correction was used to determine the average level from the peak
2. Final Average = peak reading + 20log (duty cycle), Final Average= peak reading -12.69
3. All the data measurement of peak values.
   FCC Limit for Average Measurement= 3,750+(12,500-3,750)/(470-260)*(433.92-260) μ V/m
   =80.83dBμ V/m
4. Average pulsed signal over one complete pulse train or 100 ms time frame if pulse train exceeds 100 ms
5. Maximum average in 100 ms
6. Calculate duty cycle for pulse train or 100 ms
7. Duty cycle = (t1 + t2 + t3+…tn)/T where tn = pulse width, T = pulse train length or 100 ms
8. Pulse width (PW) = 100.00ms
   2/PW = 2/100.00ms =0.02 kHz
   RBW > 2/PW (0.02kHz)
   Therefore PDCF is not needed.

Pulse Duty Cycle:

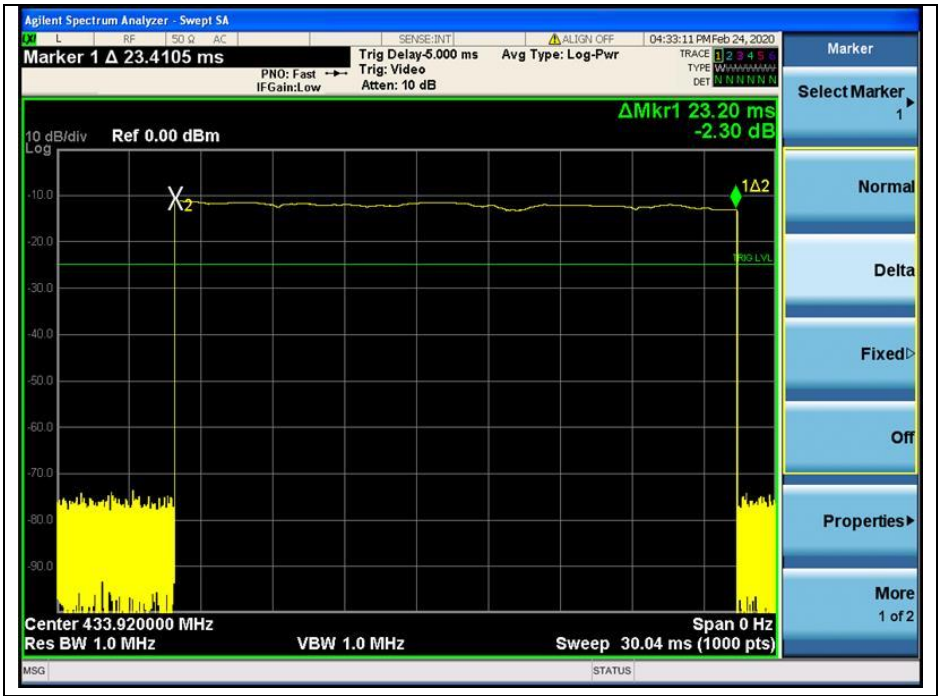
Duty cycle= 23.20/100.00=23.20%

Average Duty Factor: 20*log (Duty Cycle) = -12.69dB

Duty Cycle



the pulse train is nonperiodic or is periodic with a period that exceeds 100 ms



The 100 ms period that contains the maximum “on time”

NOTE: If the pulse train is nonperiodic or is periodic with a period that exceeds 100 ms

Find the 100 ms period that contains the maximum “on time”, Duty Cycle = on time / 100ms.

6.5 Deactivation

Temperature	26℃
Relative Humidity	36%
Atmospheric Pressure	1013mbar
Test date :	Nov. 22, 2019
Tested By :	Aaron Liang

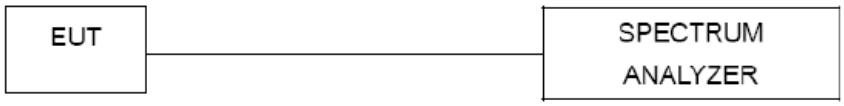
Standard requirement: 47 CFR §15.231 (a)

Test Procedure:

The following table is the setting of spectrum analyser:

Spectrum Analyser	Setting
Attenuation	Auto
Span Frequency	0Hz
RB	3MHz
VB	3MHz
Detector	Peak
Trace	Max Hold
Sweep Time	5s

TEST SETUP:



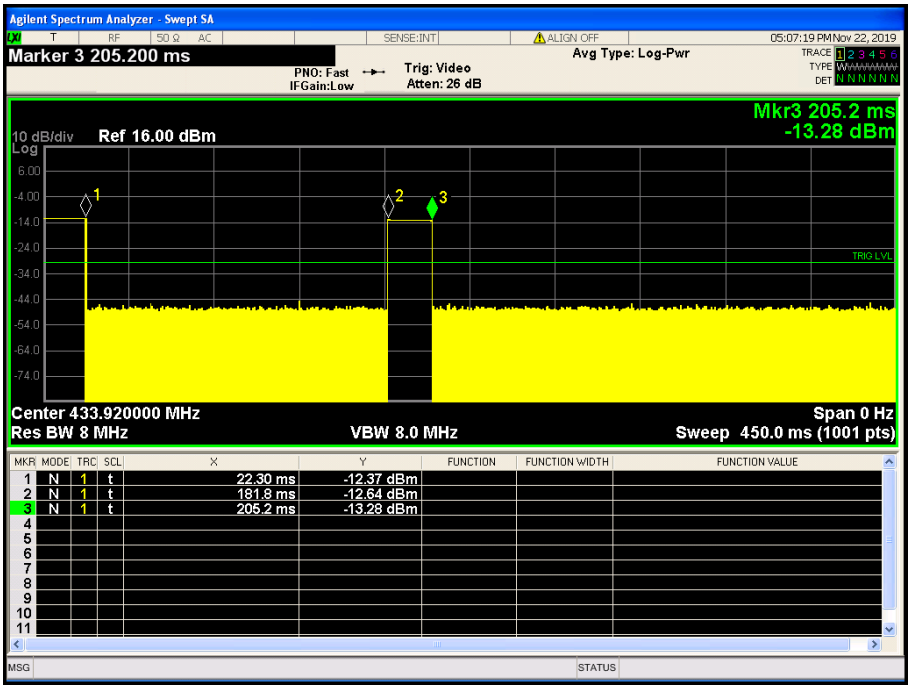
Mark: A transmitter activated automatically shall cease transmission within 5 seconds after activation

Test Result: Pass

Test Result:

Frequency (MHz)	The duration of transmission(s)	Limit (s)	Verdict (Pass)
433.92	205.2	<=5	Pass

The duration of transmission



Annex A. TEST INSTRUMENT

Frequency Range Below 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESL6	1300.5001K06-100262-eO	Apr. 04, 19	Apr. 03, 20
Bilog Antenna	Sunol Sciences	JB6	A110712	Apr. 08, 19	Apr. 07, 20
Active Antenna	CMO-POWER	AL-130	121031	Mar. 27, 19	Mar. 26, 20
Signal Amplifier	HP	8447E	443008	Mar. 28, 19	Mar. 27, 20
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 18,18	Oct. 17,21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A	N/A
Universal Radio Communication	ROHDE&SCHWARZ	CMU200	112012	Mar. 28,19	Mar. 27,20
Universal Radio Communication	ROHDE&SCHWARZ	CMU200	121393	Mar. 28,19	Mar. 27,20
Wireless Communication Test Set	ROHDE&SCHWARZ	CMW500	1201.0002K500-155842-Gd	Aug. 06, 19	Aug. 05, 20

Frequency Range Above 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum	Agilent	E4446A	MY46180622	May. 08,19	Mar. 07, 20
MXA signal analyzer	Agilent	N9020A	MY49100060	Mar. 28, 19	Mar. 27, 20
Horn Antenna	COM-POWER	HAH-118	71259	Mar. 22, 19	Mar. 21, 20
Horn Antenna	COM-POWER	HAH-118	71283	Mar. 20, 19	Mar. 19, 20
SHF-EHF Horn	Schwarzbeck	BBHA9170	BBHA9170147	Jun. 30, 19	Jun. 29, 20
SHF-EHF Horn	Schwarzbeck	BBHA9170	BBHA9170242	Jun. 30, 19	Jun. 29, 20
AMPLIFIER	EM Electornic Corporation	EM01G26G	60613	Mar. 28, 19	Mar. 27, 20

AMPLIFIER	Emc Instruments Corporation	Emc012645	980077	Jan. 04, 19	Jan. 03,20
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 18,18	Oct. 17,21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A	N/A
Universal Radio Communication	ROHDE&SCHWARZ	CMU200	112012	Mar. 28,19	Mar. 27,20
Universal Radio Communication	ROHDE&SCHWARZ	CMU200	121393	Mar. 28,19	Mar. 27,20
Wireless Communication Test Set	ROHDE&SCHWARZ	CMW500	1201.0002K500-155842-Gd	Aug. 06, 19	Aug. 05, 20

Antenna Port Conducted RF measurement

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Wireless Connectivity	R&S	CMW270	1201.0002K75	Dec. 18, 19	Dec. 17, 20
MXA VEXTOR SIGNAL	Agilent	n5182a	MY50140530	Mar. 28,19	Mar. 27,20
MXA signal analyzer	Agilent	n9020a	MY49100060	Mar. 28,19	Mar. 27,20
RF Control Unit	Tonscend	JS0806-2	188060112	Mar. 28,19	Mar. 27,20
Signal Generation	Agilent	E4421B	US40051152	Dec. 18, 19	Dec. 17, 20
DC Power Supply	Agilent	E3640A	MY40004013	Mar. 28,19	Mar. 27,20
Programmable Temperature &	Hongjin	HYC-TH-225DH	DG-180746	Mar. 28,19	Mar. 27,20
Test System	Tonscend	JS 1120-3	N/A	N/A	N/A
Power Splitter	Weinschel	1580-1	TL177	Mar. 20,19	Mar. 19,20
Universal Radio Communication	ROHDE&SCHWARZ	CMU200	112012	Mar. 28,19	Mar. 27,20

Universal Radio Communication	ROHDE&SCHWARZ	CMU200	121393	Mar. 28,19	Mar. 27,20
Wireless Communication Test Set	ROHDE&SCHWARZ	CMW500	1201.0002K50 0-155842-Gd	Nov. 1, 19	Oct. 31, 20

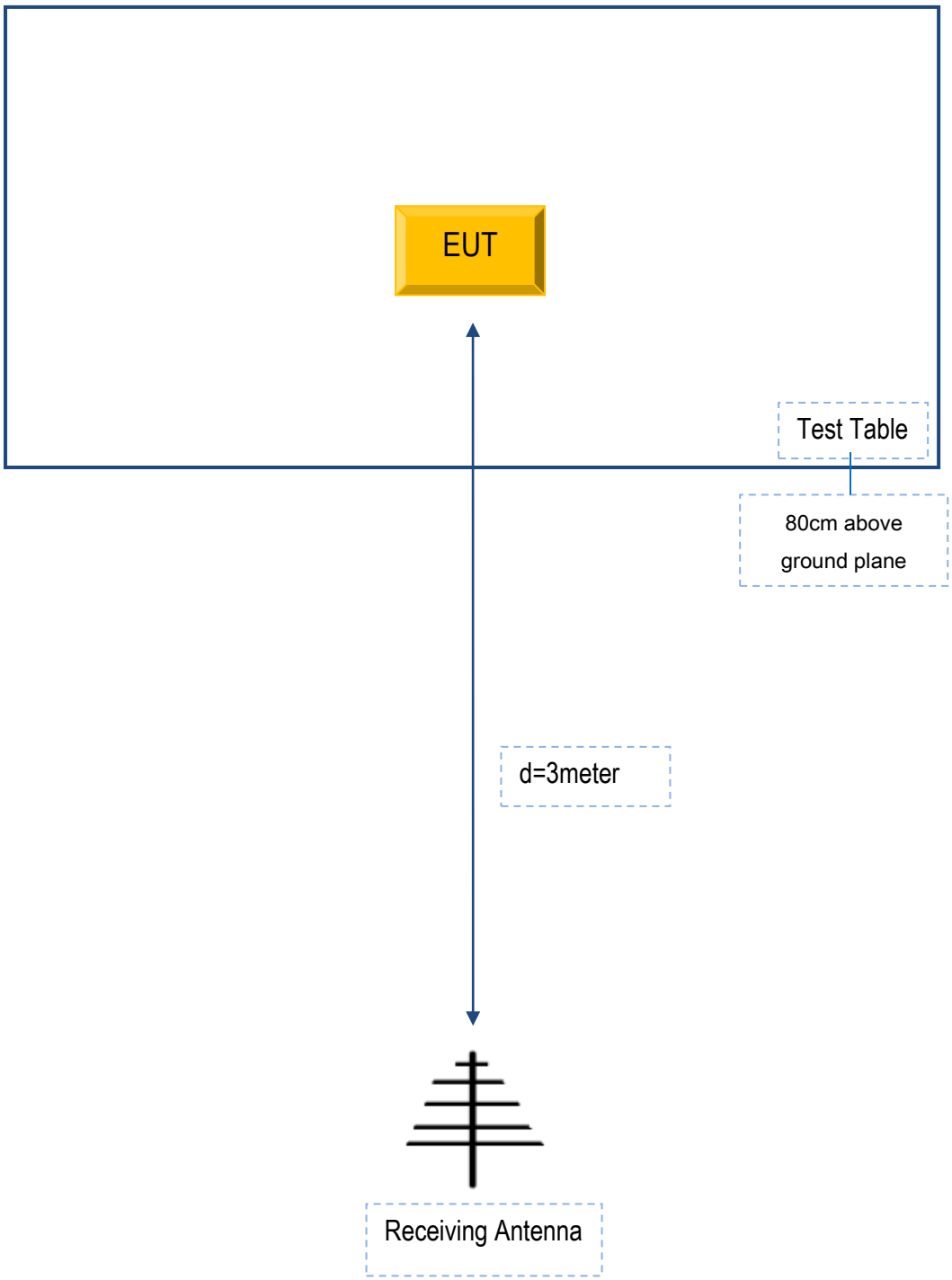
Annex B. EUT And Test Setup Photographs

Please refer to the attached file (EUT and Setup Photos).

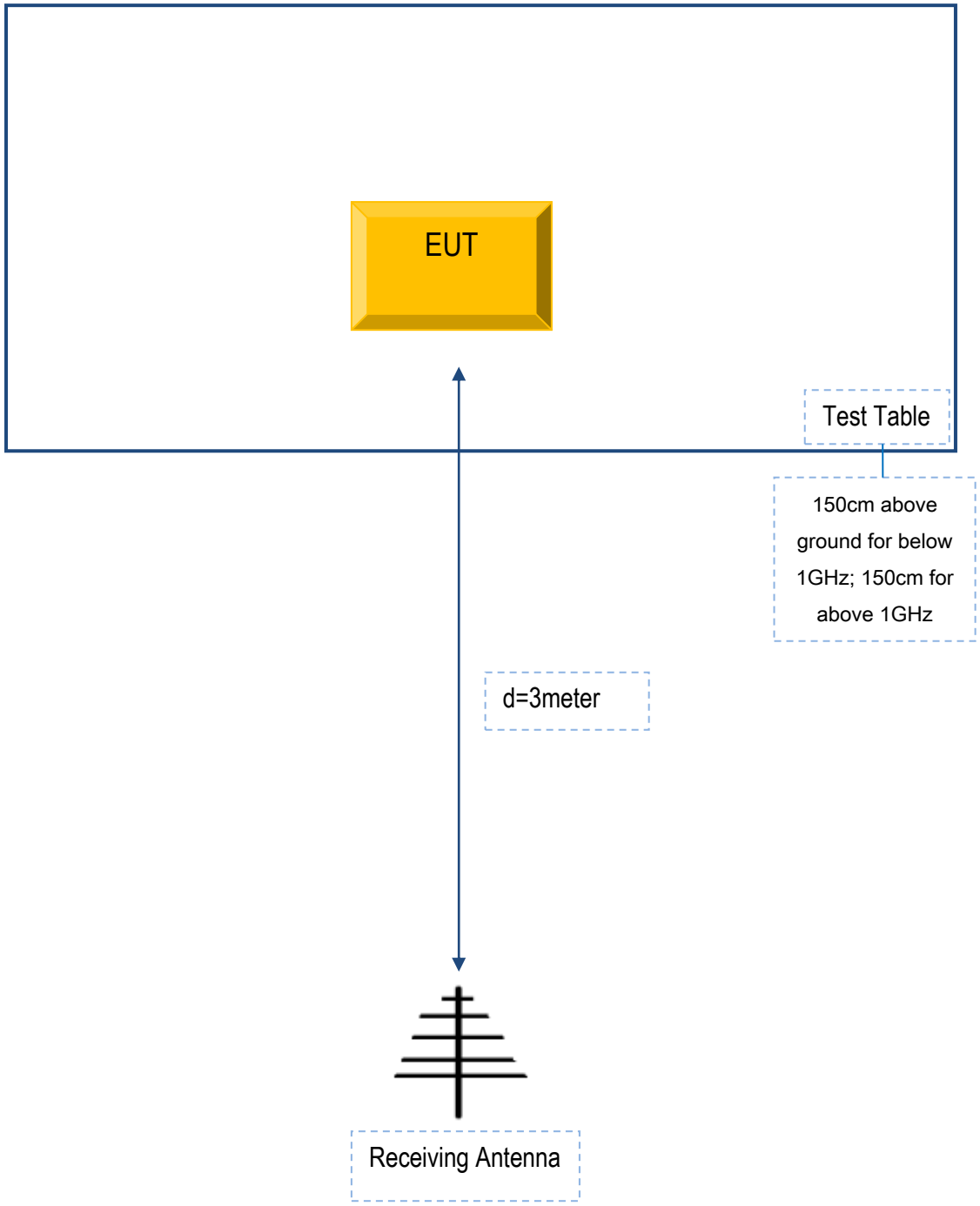
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions （Below 1GHz）.



Block Configuration Diagram for Radiated Emissions (Above 1GHz)



Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
N/A	N/A	N/A	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
N/A	N/A	N/A	N/A	N/A

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

Annex E. DECLARATION OF SIMILARITY

X-Sense Innovations Co., Ltd.

To:
775 Montague Expressway Milpitas,CA 95035,USA

Declaration Letter

Dear Sir,

For our business issue and marketing requirement, we would like to list serial model numbers on the FCC reports, as following:

Model No: NV004BB

Serial Model No: NV004BW, NV004CB ,NV004CW ,NV004DB, NV004DW ,NV004EB, NV004EW, DB-B
We declare that : NV004BB ,NV004BW, NV004CB ,NV004CW ,NV004DB, NV004DW ,NV004EB, NV004EW, DB-B all models the same PCB , accessories ,the difference of these is listed as below
Thank you very much.

Main Model No	Serial Model No	Difference
NV004BB	NV004BW, NV004CB, NV004CW, NV004DB, NV004DW, NV004EB, NV004EW, DB-B	Different: Model ,Colour and shipped with different number of receivers. NV004BB, shipped with two Receivers (Black) NV004BW, shipped with two Receivers (White) NV004CB, shipped with one Receiver (Black) NV004CW, shipped with one Receiver (White) NV004DB, shipped with one Receiver (Black) NV004DW, shipped with one Receiver (White) NV004EB, shipped with one Receiver (Black) NV004EW,shipped with one Receiver (White) DB-B OEM Brand

Sincerely,

Client's signature: 李得

2019.12.31

Second Party
Address: B4-503-D,Tower B, Kexing Science Park, No.15 Keyuan Road, Technology Park Community,Yuehai Avenue,Nanshan District, Shenzhen, China
Name of Corporation: X-Sense Innovations Co., Ltd..
Name: Xu Li
Date: 2019-12-24