RED-EMC TEST REPORT

for

TWS Airbuds

Model:

Prepared for :

Prepared By : **Shenzhen NCT Testing Technology Co., Ltd.**
1&4/ F, No. B Building, Mianshang Younger Pioneer Park, Hangcheng Road, Gushu Xixiang Street, Baoan District, Shenzhen, Guangdong, China.

Date of Test:	**Sep. 03, 2019 to Sep. 10, 2019**
Date of Report:	**Sep. 11, 2019**
Report Number:	**NCT19035456XE2-2**

Tested By Beryl Zhao
Beryl Zhao

Reviewed By

The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from NCT Testing Technology.

Table of Contents

1.0 General Details

1.1 Client Information

Application:	
Address of Application:	
Manufacturer:	
Address of Manufacturer:	

1.2 General Description of E.U.T.

Product Name:	TWS Airbuds
Model:	
Additional Model:	N/A
Trade Mark:	N/A
Bluetooth Version:	5.0
Frequency:	2402 MHz-2480 MHz
Channel Number:	79
Antenna Type:	Internal Antenna
Antenna Gain:	0dBi
Type of Modulation:	GFSK, Pi/4 QDPSK, 8DPSK
Power Supply:	DC 5V, 1A.

Model Difference:	N/A

Remark: In this report, N.A. means Not Applicable;
E.U.T. means Equipment Under Test;
N.R.R. means No Reaction Recognized.

1.3 Test Facility

Name :	Shenzhen NCT Testing Technology Co., Ltd.
Address:	1&4/ F, No. B Building, Mianshang Younger Pioneer Park, Hangcheng Road, Gushu Xixiang Street, Baoan District, Shenzhen, Guangdong, China.
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Fax:	+86-755-27790922

1.4 Test Standards

ETSI EN 301 489-1 v 2.2.0 (2017-03)
Electromagnetic compatibility and Radio spectrum Matters (ERM);
Electromagnetic Compatibility (EMC) standard for radio equipment and services;
Part 1: Common technical requirements
ETSI EN 301 489-17 v 3.2.0 (2017-03)
Electromagnetic compatibility and Radio spectrum Matters (ERM);
Electromagnetic Compatibility (EMC) standard for radio equipment and services;
Part 17: Specific conditions for 2.4GHz wideband transmission systems and 5GHz high performance RLAN equipment

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

2.0 Test equipments and Associated Equipment used during the test.

2.1 Test Equipments

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
Conducted emission					
EMI Test Receiver	ESCS30	100139	R&S	July 09, 2019	July 08, 2020
LISN	LS16C	16010222119	AFJ	July 09, 2019	July 08, 2020
Radiated emission					
EMI Test Receiver	ESCS30	100139	R&S	July 09, 2019	July 08, 2020
Spectrum Analyzer	FSEM	1079.8500.30	R&S	July 09, 2019	July 08, 2020
Amplifier	8447D	2727A05017	H.P.	July 09, 2019	July 08, 2020
Antenna	VULB9163	N.A.	SCHWARZBECK	July 09, 2019	July 08, 2020
Amplifier	EM30265	07032613	EM Electronics Corporation	July 09, 2019	July 08, 2020
Harmonic & Flicker					
Harmonics Flicker Test System	PACS-1	72305	CI	July 09, 2019	July 08, 2020
5K VA AC Power source	5001iX	56060	CI	July 09, 2019	July 08, 2020
Electrostatic Discharge					
Electostastic Discharge Generator	ESD61002AG	PR12092502	Prima	July 09, 2019	July 08, 2020
Continuous radiated disturbances					
Signal Generator	2022D	119246/003	Maconi	July 09, 2019	July 08, 2020
Power Amplifier	A00181-1000	9801-112	M2S	July 09, 2019	July 08, 2020
Power Amplifier	AC8113/ 800-250A	9801-179	M2S	July 09, 2019	July 08, 2020
Power Antenna	CBL6140A	1204	SCHAFFNER	July 09, 2019	July 08, 2020
EFT/Surge/Dip					
Fast Transient Burst Simulator	EFT61004BG	PR12074375	Prima	July 09, 2019	July 08, 2020
Lightning Surge Generator	SUG61005BG	PR12125534	Prima	July 09, 2019	July 08, 2020
CYCLE SAG SIMULATOR	DRP61011AG	PR12106201	Prima	July 09, 2019	July 08, 2020
Continuous conducted disturbances					
Signal Generator	2022D	119246/003	Maconi	July 09, 2019	July 08, 2020
Power Amplifier	A00181-1000	9801-112	M2S	July 09, 2019	July 08, 2020
CDN	M3-8016	003683	MEB	July 09, 2019	July 08, 2020

2.2 AE used during the test

Equipment type	Manufacturer	Model
N.A.		
N.A.		
N.A.		
N.A.		

2.3 Measurement Uncertainty（95% confidence levels, k=2)

No.	Item	MU
1.	Temperature	±0.1℃
2.	Humidity	±1.0%
3.	Spurious emissions, conducted	±3.7dB
4.	Spurious emissions, radiated	±4.5dB

3.0 Technical Test

3.1 Summary of Test Results

No deviations from the technical specification(s) were ascertained in the course of the tests Performed	
Final Verdict: (Only "Passed" if all Measurements are "Passed")	Pass

3.2 Test Report

Emission (EMI)

EMI Phenomenon	Port	Requirement		Applicability
		Standard	Basic Standard	
Conducted Interference Voltage	AC Mains	ETSI EN 301 489-1 V2.1.1 Clause 8.4	EN 55032: 2015	N.A.
Conducted Interference Voltage	DC	ETSI EN 301 489-1 v 2.1.1 Clause 8.3	EN 55032: 2015	N.A.
Radiated Interference Field Strength	Enclosure of Ancillary equipment	ETSI EN 301 489-1 v 2.1.1 Clause 8.2	EN 55032: 2015	Applicable
Harmonic Current Emissions	AC Mains Input Port	ETSI EN 301 489-1 v 2.1.1 Clause 8.5	EN 61000-3-2: 2014	N.A.
Flicker & Voltage Fluctuation	AC Mains Input Port	ETSI EN 301 489-1 v 2.1.1 Clause 8.6	EN61000-3-3: 2013	N.A.
Conducted Interference Voltage	Telecommunication port	ETSI EN 301 489-1 v 2.1.1 Clause 8.7	EN 55032: 2015	N.A.

Immunity (EMS)

EMS Phenomenon	Port	Requirement		Applicability
		Standard	Basic Standard	
Electrostatic Discharge (ESD)	Enclosure	ETSI EN 301 489-1 v 1.9.2 Clause 9.3	EN 61000-4-2:2009	Applicable
RF-Electro-Magnetic Field	Enclosure Telecommunication	ETSI EN 301 489-1 v 1.9.2 Clause 9.2	EN 61000-4-3:2010	Applicable
Fast Transients, Burst	Power Line AC/DC Telecommunication	ETSI EN 301 489-1 v 1.9.2 Clause 9.4	EN 61000-4-4: 2004+A1:2010	N.A.
Surge	Power Line (1 phase) Telecommunication	ETSI EN 301 489-1 v 1.9.2 Clause 9.8	EN 61000-4-5:2006	N.A.
Transients & Surge Vehicular Environment	Power Line (Car Charge)	ETSI EN 301 489-1 v 1.9.2 Clause 9.6	ISO 7637-2:2004	N.A.
RF Common Mode (0.15-80MHz)	Power Line AC/ DC signal Lines	ETSI EN 301 489-1 v 1.9.2 Clause 9.5	EN 61000-4-6:2009	N.A.
Vol. Dips, Interruptions & Fluctuations	Input & Output AC Ports only	ETSI EN 301 489-1 v 1.9.2 Clause 9.7	EN 61000-4-11:2004	N.A.

Clause 8.2 Emission Test – Radiated Emission

This test assesses that ability of ancillary equipment to limit their internal noise from being radiated from the enclosure.

According to EMC basic standard (EN 55032)

Measurement according to EMC basic standard, The test results correspond to the 3m Semi-Anechoic Chamber results.

The E.U.T. and it simulators are placed on a turntable which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The E.U.T. was positioned such that the distance from antenna to the E.U.T. was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission, all of The interface cables must be manipulated according to EN55022: 2010 on radiated measurement.

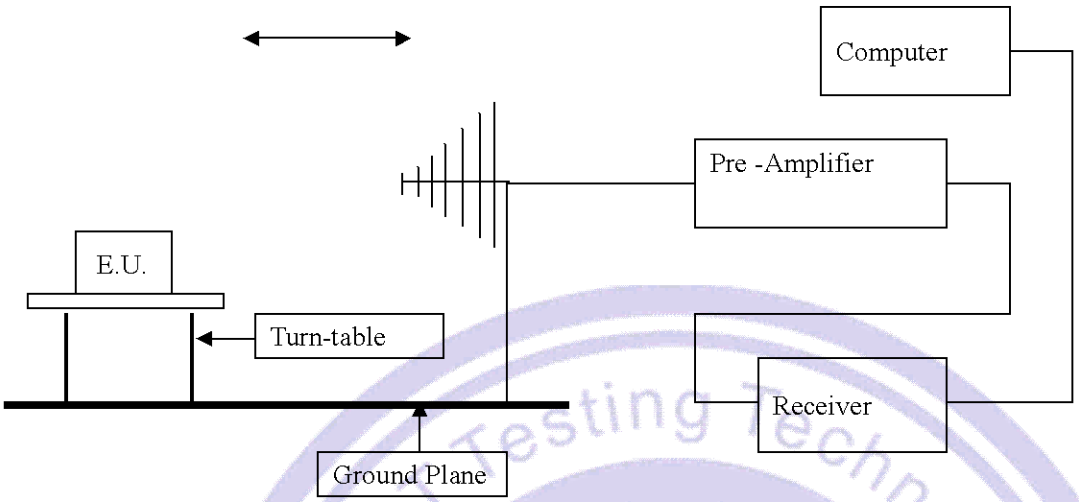
Radiated emissions were invested over the frequency range from 30MHz to 1 GHz using a receiver bandwidth of 120kHz.

Radiated Emission was performed at an antenna to E.U.T. distance of 3 meters.

Radiated Emission Test

Block diagram of Test setup

Distance = 3m



Power line conducted Emission Limit

Frequency Range (MHz)	Distance (m)	Quasi-Peak limits (dB μ V/m)
30-230	10/3	30.0/40.0
230-1000	10/3	37.0/47.0
1000-3000	3	50 （AV）/70（PK）
3000-6000	3	54 （AV）/74（PK）

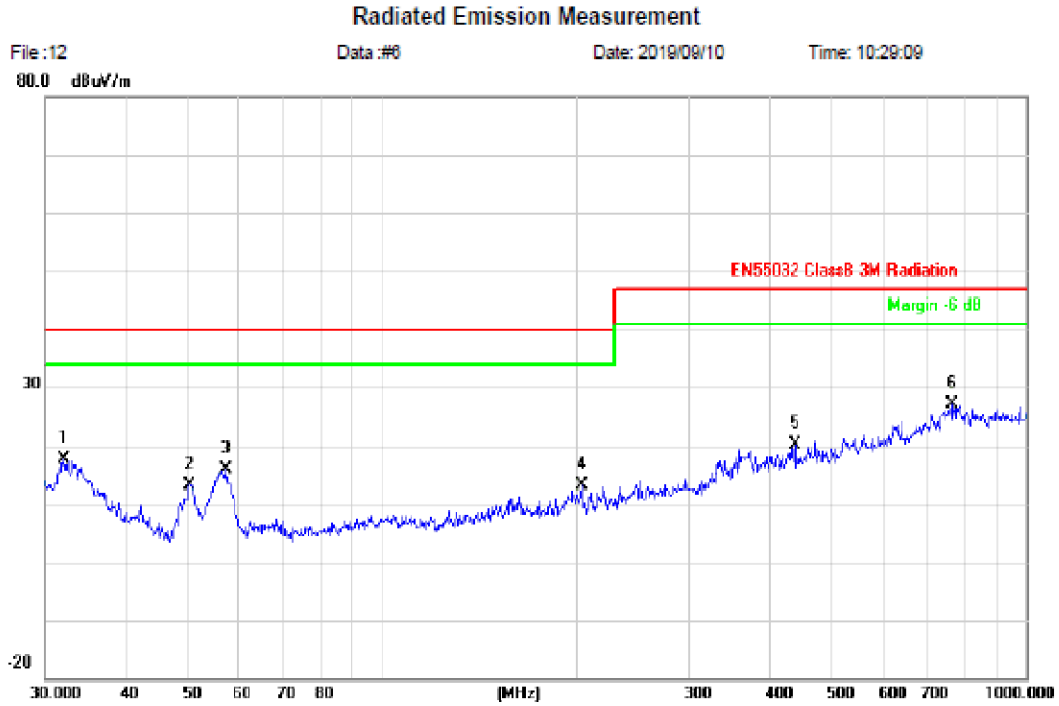
Note: The lower limit shall apply at the transition frequencies

Environmental conditions: Temperature: 22° C Humidity: 53% Atmospheric pressure: 103Pa

Not:

1. The worst case is submitted in the test report.
2. The receiver Radiated Emission was conducted with different settings, using the relevant and pre-amplifiers for the relevant frequency ranges.

A. Radiated Emission In Horizontal (30MHz----1000MHz)



Site NCT ETS Chamber #1 Polarization: *Horizontal* Temperature: 26

Limit: EN55032 ClassB 3M Radiation Power: Humidity: 55 %

EUT: Distance:

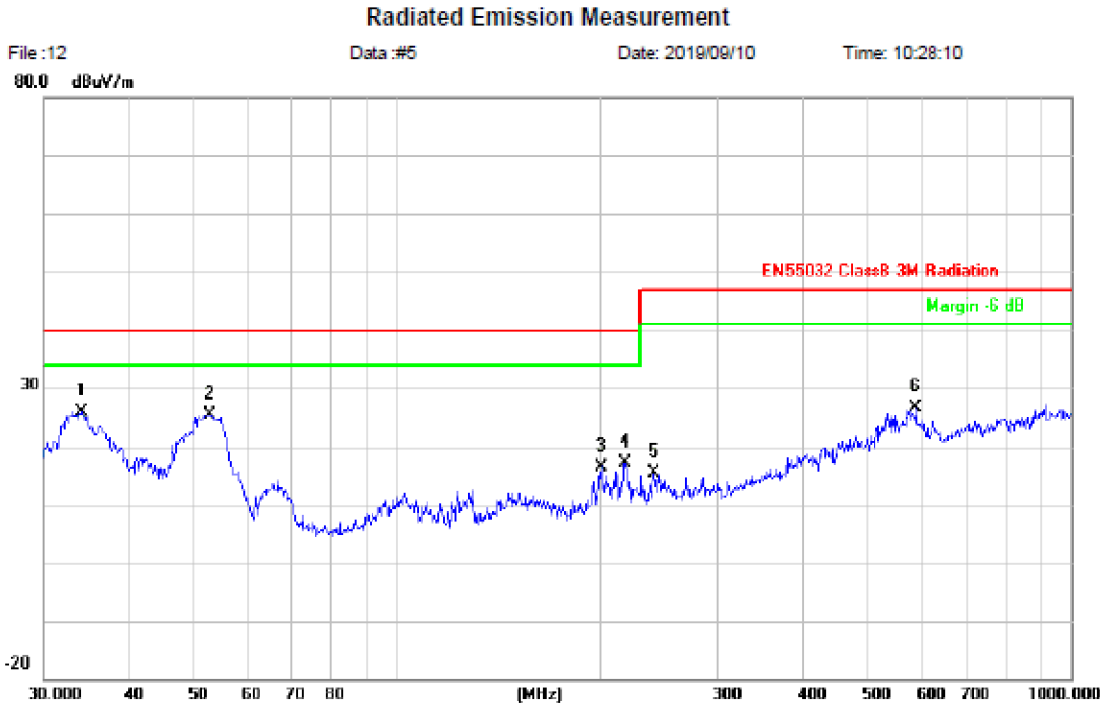
M/N:

Mode:

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		32.0667	32.27	-14.73	17.54	40.00	-22.46	peak			
2		50.2324	37.05	-23.80	13.25	40.00	-26.75	peak			
3		57.3923	39.73	-23.90	15.83	40.00	-24.17	peak			
4		204.2377	32.28	-19.25	13.03	40.00	-26.97	peak			
5		437.1199	31.95	-11.75	20.20	47.00	-26.80	peak			
6	*	768.7481	32.65	-5.63	27.02	47.00	-19.98	peak			

B. Radiated Emission In Vertical (30MHz----1000MHz)



Site NCT ETS Chamber #1 Polarization: *Vertical* Temperature: 26

Limit: EN55032 ClassB 3M Radiation Power: Humidity: 55 %

EUT: Distance:

M/N:

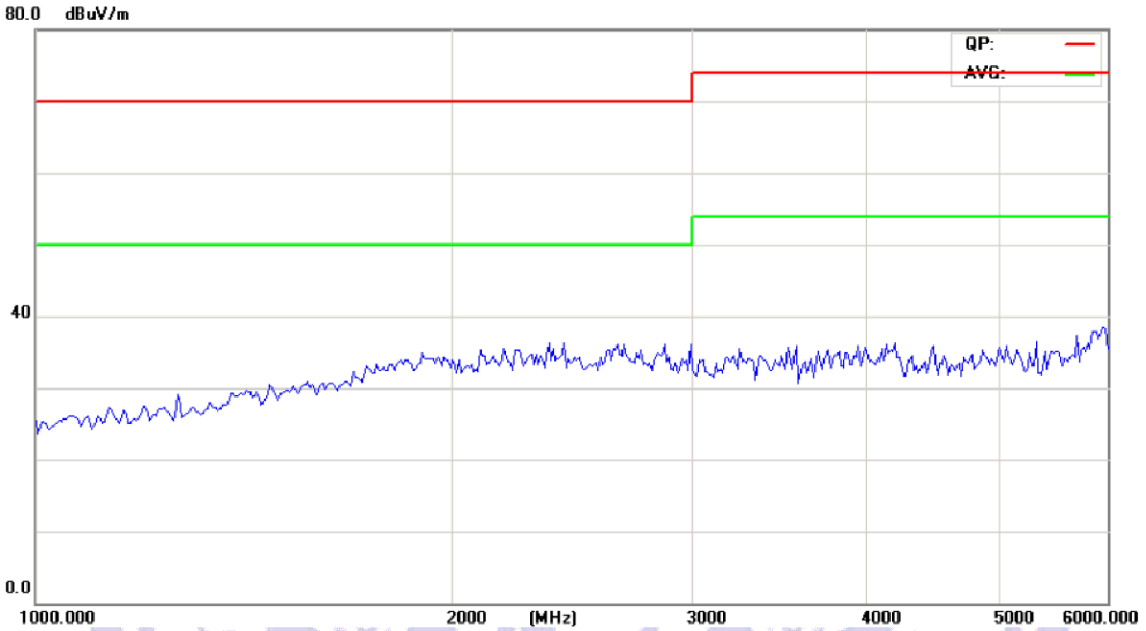
Mode:

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	34.1561	41.90	-16.02	25.88	40.00	-14.12	peak			
2		52.9453	49.22	-23.83	25.39	40.00	-14.61	peak			
3		201.3930	35.88	-19.38	16.50	40.00	-23.50	peak			
4		218.3085	35.84	-18.62	17.22	40.00	-22.78	peak			
5		240.8303	32.82	-17.53	15.29	47.00	-31.71	peak			
6		588.9050	35.45	-8.79	26.66	47.00	-20.34	peak			

C. Radiated Emission In Horizontal (1000MHz----6000MHz)

E.U.T. Description:	TWS Airbuds
Operation Mode:	N/A
Tested By:	Beryl Zhao
Test Date:	Sep. 10, 2019

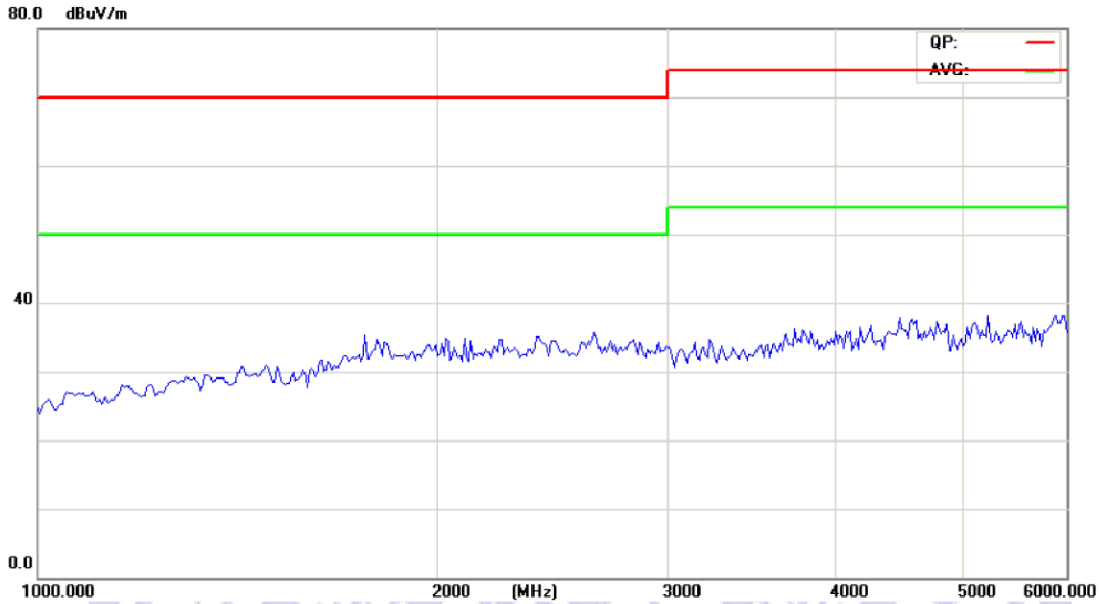


Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
		H	
		H	

The test data shows much less than the limit, no necessary take down the records.

D. Radiated Emission In Vertical (1000MHz----6000MHz)

E.U.T. Description:	TWS Airbuds
Operation Mode:	N/A
Tested By:	Beryl Zhao
Test Date:	Sep. 10, 2019



Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)
		V	
		V	

The test data shows much less than the limit, no necessary take down the records.

Clause 8.3 DC Power Input/Output Ports Conducted Emissions

Test Method:

According to EMC Basic Standard (EN 55032 [7] Class-B) and the Artificial Mains Networks (AMN) shall be connected to a DC power source.

The measurement frequency range extends from 150 kHz to 30 MHz. When the E.U.T. is a transmitter operating at frequencies below 30 MHz, then the exclusion band for transmitters applies (see clause 4.3) for measurements in the transmit mode of operation.

For emission measurements on DC output ports the relevant port shall be connected via an AMN to a load drawing the rated current of the source.

Environmental conditions: Temperature: 22° C Humidity: 53% Atmospheric pressure: 103kPa

A Conducted Emission on Live Terminal of the power line (150kHz to 30MHz)

E.U.T. Description: --
Operation Mode: --
Tested By: --
Test date: --

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
--	--	--	--	--	--	--
--	--	--	--	--	--	--

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

E.U.T. Description: --
Operation Mode: --
Tested By: --
Test date: --

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
--	--	--	--	--	--	--

Note: The test item is not applicable.

Clause 8.4 AC Line Conducted Emissions

According to EMC Basic Standard (EN 55032 [7] Class-B)

1. For the table top E.U.T. the distance to the reference ground plane (wall) should be 40 cm.
2. AC input line plugged into LISN.
3. The frequency spectrum from 0.15MHz to 30MHz was investigated. All readings are quasi -peak values with a resolution bandwidth of 9 KHz
4. The worse cases was selected to conducted the test

Environmental conditions: Temperature: 22° C Humidity: 53% Atmospheric pressure: 103kPa

A Conducted Emission on Live Terminal of the power line (150kHz to 30MHz)

E.U.T. Description: --
Operation Mode: --
Tested By: --
Test date: --

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
--	--	--	--	--	--	--
--	--	--	--	--	--	--

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

E.U.T. Description: --
Operation Mode: --
Tested By: --
Test date: --

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
--	--	--	--	--	--	--
--	--	--	--	--	--	--

Note: The test item is not applicable.

Clause 8.5 Telecommunication Ports

According to EMC Basic Standard (EN 55032 [6] Class-B)

1. For the table top E.U.T. the distance to the reference ground plane (wall) should be 40 cm.
2. AC input line plugged into ISN.
3. The frequency spectrum from 0.15MHz to 30MHz was investigated. All readings are quasi -peak values with a resolution bandwidth of 9 KHz
4. The worse cases was selected to conducted the test

Environmental conditions: Temperature: 22° C Humidity: 53% Atmospheric pressure: 103kPa

A Conducted Emission on Telecommunication ports (150kHz to 30MHz)

E.U.T. Description: --

Operation Mode: --

Tested By: --

Test date: --

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

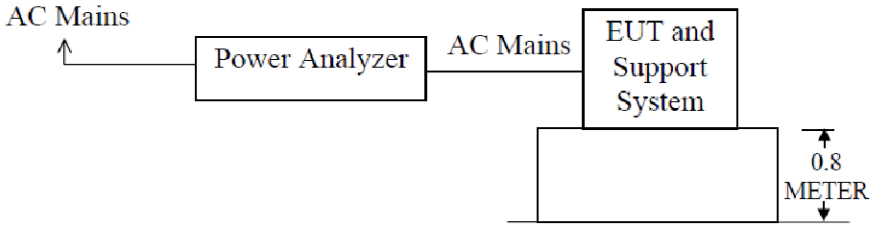
Frequency(MHz)	Reading(dB μ V)		Limit(dB μ V)	
	Quasi-peak	Average	Quasi-peak	Average
--	--	--	--	--
--	--	--	--	--

Note: The test item is not applicable.

Clause 8.6 Harmonic Current Emissions

E.U.T. Operating Mode: --

Block Diagram of Test Setup.



This test was performed as per EMC Basic Standard EN61000-3-2 Class A

Results

Port	E.U.T. Operating mode	Result (Passed / Failed)
AC Input	--	N.A.

Note: The test item is not applicable.

Test Equipment

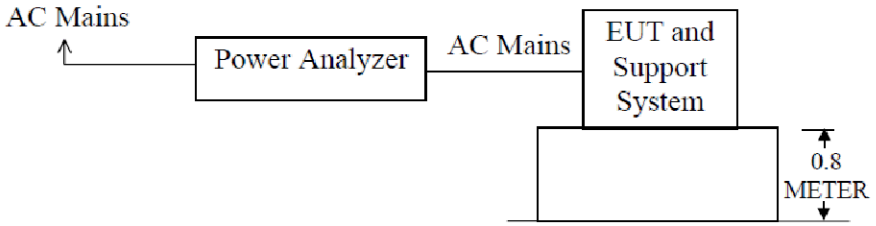
Please refer to Section 6 this report.

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

Clause 8.7 Flicker and Voltage Fluctuation

E.U.T. Operating Mode: --

Block Diagram of Test Setup.



This test was performed as per EMC Basic Standard EN 61000-3-3

Limits of Voltage Fluctuation and Flicks Measurement

Test Item	Limit	Note
P_{st}	1.0	Pst means short-term flicker indicator
P_{lt}	0.65	Plt means long-term flicker indicator
T_{dt} (ms)	200	Tdt means maximum time that dt exceeds 3%.
d_{max} (%)	4	Dmax means maximum relative voltage change.
dc (%)	3	Dc means relative steady-state voltage change.

Test Equipment
Please refer to Section 6 this report.

Environmental conditions: Temperature: 21° C Humidity: 54% Atmospheric pressure: 103kPa

Results

Port	E.U.T. Operating mode	Result (Pass/ Fail)
AC Input	--	N.A.

Note: The test item is not applicable.

Clause 9.2 Immunity Test – Radiated, RF Electromagnetic Field

According to EMC Basic Standard (EN 61000-4-3)
E.U.T. Operation Mode: Tx mode
Type of Port: Enclosure
Performance Criterion: CT/CR
The distance between the turn-table axis and transmitting antenna is 3m.
Field strength = 3V/m
Start Frequency = 80MHz Stop Frequency = 1000MHz and
Start Frequency = 1400MHz Stop Frequency = 2700MHz
Frequency Step =1% of the present frequency
The test signal is amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1000 Hz

Environmental conditions: Temperature: 22° C Humidity: 55% Atmospheric pressure: 103kPa

Results

Frequency (MHz)	Antenna Polarity	Radiation to	Reaction of the E.U.T. During and after test	Result
80-1000, 1400-2700	Horizontal	Front	N.R.R.	Pass
80-1000, 1400-2700	Vertical	Front	N.R.R.	Pass
80-1000, 1400-2700	Horizontal	Rear	N.R.R.	Pass
80-1000, 1400-2700	Vertical	Rear	N.R.R.	Pass
80-1000, 1400-2700	Horizontal	Left	N.R.R.	Pass
80-1000, 1400-2700	Vertical	Left	N.R.R.	Pass
80-1000, 1400-2700	Horizontal	Right	N.R.R.	Pass
80-1000, 1400-2700	Vertical	Right	N.R.R.	Pass

Note: Performance criteria A observed.

Test Equipment
Please refer to Section 6 this report.

Test Procedure
The E.U.T. and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane so that the distance from antenna to the E.U.T. was 3 meters.
Both horizontal and vertical polarization of the antenna and four sides of the E.U.T. are set on measurement.
In order to judge the E.U.T. performance, a camera is used to monitor E.U.T.

Clause 9.3 Electrostatic Discharge

According to EMC basic standard (EN61000-4-2)
E.U.T. Operation Mode: Tx mode
Type of Port: Enclosure
Performance Criterion: TT/TR
For the table top E.U.T. the distance to the reference ground plane should be 80 cm.
Direct contact discharge on conducting surfaces of E.U.T.
Indirect air discharge on insulating surfaces of E.U.T.
±2kV, ±4kV direct discharge & ±2kV, ±4kV, ±8kV air discharge

Test Equipment
Please refer to Section 6 this report.

Environmental conditions: Temperature: 24° C Humidity: 54% Atmospheric pressure: 103kPa

Test Results

Item	Contact discharge to conducted surfaces and to coupling planes		Air discharge at insulating surfaces	Result
	Direct Contact discharge	Indirect Contact discharge		
Test Voltage	Reaction of E.U.T.	Reaction of E.U.T.	Reaction of E.U.T.	Pass/Fail
+2kV	N.R.R.	N.R.R.	N.R.R.	Pass
-2kV	N.R.R.	N.R.R.	N.R.R.	Pass
+4kV	N.R.R.	N.R.R.	N.R.R.	Pass
-4kV	N.R.R.	N.R.R.	N.R.R.	Pass
+8kV	N.A.	N.A.	N.R.R.	Pass
-8kV	N.A.	N.A.	N.R.R.	Pass

Clause 9.4 Fast Transients, Common Mode

According to EMC basic standard (EN61000-4-4)
E.U.T. Operation Mode: --
Type of Port: AC mains power & Ethernet Port
Performance Criterion: TT/TR
For the table top E.U.T. the distance to the reference ground plane should be 80 cm.
The test level for AC mains power input ports shall be 1KV open circuit.

Test Setup
The minimum distance between the E.U.T. and all other conductive structures, except the ground reference plane shall be more than 0.5 m.

Test Equipment
Please refer to Section 6 this report.

Environmental conditions: Temperature: 23° C Humidity: 53% Atmospheric pressure: 103kPa

Test Results

Line	Test Voltage	Inject Time(s)	Performance			Result
			Required	Observation(+)	Observation(-)	Pass/Fail
L	1kV	120	TT/TR	N.A.	N.A.	N.A.
N	1kV	120	TT/TR	N.A.	N.A.	N.A.
PE	1kV	120	TT/TR	N.A.	N.A.	N.A.
L N	1kV	120	TT/TR	N.A.	N.A.	N.A.
L PE	1kV	120	TT/TR	N.A.	N.A.	N.A.
N PE	1kV	120	TT/TR	N.A.	N.A.	N.A.
L N PE	1kV	120	TT/TR	N.A.	N.A.	N.A.

Note: The test item is not applicable.

Clause 9.5 RF Common Mode

According to EMC basic standard (EN61000-4-6)
E.U.T. Operation Mode: --
Type of Port: AC mains power input/output & Ethernet Port
Performance Criterion: CT/CR
Start Frequency = 150KHz Stop Frequency = 80MHz
The step size is 1% of the preceding frequency value
The test signal is amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1000 Hz

Test Equipment
Please refer to Section 6 this report.

Environmental conditions: Temperature: 24° C Humidity: 52% Atmospheric pressure: 103kPa

Test Setup
Injection via CDN or MIC clamp

Test Results

Injection On	Injection Via	Reaction of the E.U.T. During and after test	Result
AC input power line/DC power port	CDN	N.A.	N.A.

Note: The test item is not applicable.

Clause 9.6 Transients and Surges in the Vehicular Environment

The test method shall be in accordance with ISO 7637-2 for 12 V/24V DC powered equipment

E.U.T. Operation Mode: --
Type of Port: DC power input port
Performance Criterion: CT/CR

Test Requirement:
a) Pulse 3a and 3b, level III, with the test time reduced to 20 min for each;
Pulse 4, level III, 10 pulses, with the characteristics as follows:
Vs = -6.5V; Va = -2,5 V; t6 = 25 ms; t7 = 20 ms; t8 = 20ms; t_9 = 5 s; t_{10}=50ms, t_{11}=20ms,pulse cycle time: 60 s

b) Pulse 1, level III: t_1 = 2,5 s; t_2=200ms, t_3=50 μ s 10 pulses;
Pulse 2, level III: t_1 = 2,5 s; 10 pulses;
Both a) and b) shall be done as the manufacturer does not require the radio equipment to have a direct connection to the 12 V and 24V main vehicle battery

Test Equipment
Please refer to Section 6 this report.

Environmental conditions: Temperature: 23° C Humidity: 53% Atmospheric pressure:103kPa

Test Result:
For 12V system

Test Pulse Number	Test Voltage	Test Level	Number of test pulses or test time	Reaction of E.U.T. during and after Test	Test result
1	-75 V	III	10pulses	N.A.	N.A.
2a	+37 V	III	10pulses	N.A.	N.A.
2b	+10 V	III	10pulses	N.A.	N.A.
3a	-112 V	III	20min	N.A.	N.A.
3b	+75 V	III	20min	N.A.	N.A.
4	-6 V	III	10pulses	N.A.	N.A.

For 24V system

Test Pulse Number	Test Voltage	Test Level	Number of test pulses or test time	Reaction of E.U.T. during and after Test	Test result
1	-450 V	III	10pulses	N.A.	N.A.
2a	+37 V	III	10pulses	N.A.	N.A.
2b	+20 V	III	10pulses	N.A.	N.A.
3a	-150 V	III	20min	N.A.	N.A.
3b	+150 V	III	20min	N.A.	N.A.
4	-12 V	III	10pulses	N.A.	N.A.

Note: The E.U.T. is not vehicular equipment, so the test item is not applicable.

Clause 9.7 Voltage Dips and Interruption

According to EMC basic standard (EN61000-4-11)
E.U.T. Operation mode: --
Type of Port: AC mains power input port
Performance Criterion: TT/TR
For the table top E.U.T. the distance to the reference ground plane should be 80 cm.

Test Equipment
Please refer to Section 6 this report.

Environmental conditions: Temperature: 23° C Humidity: 53% Atmospheric pressure: 103kPa

Test Results
Voltage Dips

Terminal Supply Voltage	Start by Trigger Angle (AC)	Duration of Test Voltage	Test Voltage	Reaction of E.U.T. during and after Test	Result
U_1		T_{U2}	U_2		
100% U_N: 230V	0°	10ms	0% UN: 0V	N.A.	N.A.
100% U_N: 230V	0°	20ms	0% UN: 0V	N.A.	N.A.
100% U_N: 230V	0°	500ms	70% UN: 161V	N.A.	N.A.
Voltage Interruption					
100% U_N: 230V	0°	5000ms	0% UN: 0V	N.A.	N.A.

Note: The test item is not applicable.

Clause 9.8 Surges Common & Differential Mode

According to EMC basic standard (EN61000-4-5)
E.U.T. operation mode: --
Type of Port: AC mains power input & Ethernet Port
Performance Criterion: TT/TR
For the table top E.U.T. the distance to the reference ground plane should be 80 cm.
1KV open circuit for common mode & 0.5KV open circuit for differential mode.

Test Equipment
Please refer to Section 6 this report.

Environmental conditions: Temperature: 21° C Humidity: 51% Atmospheric pressure:103kPa

Test Results
For AC power ports (1-phase) five positive and five negative pulses each at 0°, 90° 180°, 270°.

Repetition rate is 1 min.

Test Voltage	Reaction of the E.U.T. during and after the test				Result
	0°/pulse	90°/pulse	180°/pulse	270°/pulse	
-0.5kV +0.5kV	N.A.	N.A.	N.A.	N.A.	N.A.
-1.0kV +1.0kV	N.A.	N.A.	N.A.	N.A.	N.A.
-2.0Kv +2.0kV	N.A.	N.A.	N.A.	N.A.	N.A.
- 4kV +4kV	N.A.	N.A.	N.A.	N.A.	N.A.

Note: The test item is not applicable.

4.0 CE Mark label specification

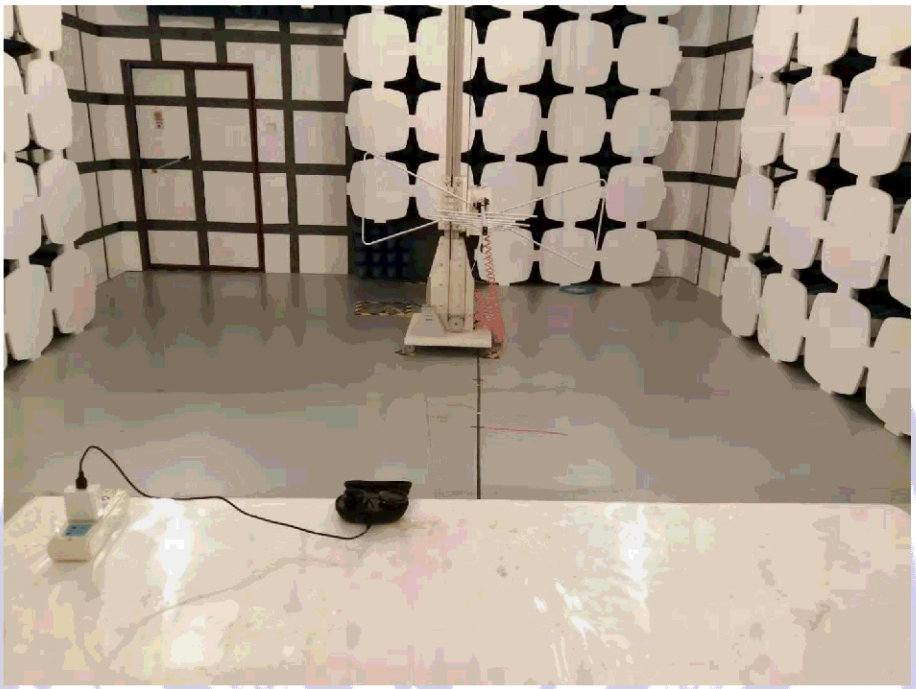
Text of the mark is black or white in colour and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the E.U.T. or silk-screened onto the E.U.T..

Mark Location: Rear enclosure

CE

5.0 Photographs – Test Setup

5.1 Photographs –Radiated Emission Test Setup



5.2 Photographs – ESD Test Setup

6.0 Photographs –E.U.T.

Please refer *to report NCT19035456XE2-1*

END OF REPORT