

SHENZHEN DNS INDUSTRIES CO., LTD.

TEST REPORT

SCOPE OF WORK

FCC TESTING—WD-286C, TLL151391

REPORT NUMBER

230214030SZN-001

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SHENZHEN DNS INDUSTRIES CO., LTD.Application
For
Certification**FCC ID: ZBC-TLL151391****3-in-1 Wireless Charger****Model: WD-286C****Additional Model: TLL151391****Transmitter**

Report No.: 230214030SZN-001

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-21]

Prepared and Checked by:**Approved by:**

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Project Engineer
Date: 29 March 2023

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MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant Class II Change _____

Equipment Type: DCD - Part 15 Low Power Transmitter Below 1705 kHz

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-21] Edition] provision.

Report prepared by:

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1.0 Summary of Test Results

Applicant: SHENZHEN DNS INDUSTRIES CO., LTD.

Applicant Address: 23/F Building A, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian, Shenzhen, China

Factory 1: HUIZHOU DNS TECHNOLOGY CO., LTD.

Factory Address : 5 Dongshun South Road, Dongjiang Hi-tech Industrial Park, Zhongkai Hi-tech Zone, Huizhou City, Guangdong, China

Factory 2: HUIZHOU D&S CABLE CO., LTD.

Factory Address: Longjin Dongjiang Industry Zone, Shuikou, Huicheng, Huizhou, Guangdong, China

Factory 3: D AND S INDUSTRIES (PHILIPPINES) CORPORATION

Factory Address: 1 to 5 Orient Goldcrest Suntrust Ecotown Building 2, Lot 8 Block 8, Sahud Ulan, Suntrust Ecotown Tanza, Region IV-A, Cavite, Philippines

Model: WD-286C, TLL151391

FCC ID: ZBC-TLL151391

TEST ITEM	REFERENCE	RESULTS
Power Line Conducted Emissions	15.207	Pass
Transmitter Radiated Emissions	15.209	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a 3-in-1 Wireless Charger with wireless charger function which operating in 350-375kHz(Output: 15W Max for Magsafe), 111-205kHz(Output2: 5W for AirPods) and 325.2-327.6kHz(Output3:2.5W for AirPods). The EUT is powered by a (DC 9V=3A, 12V=2.5A,15V=2A) adapter. The EUT is equipped with three coil antennas, it can be run alone or work simultaneously, the maximum output of the wireless charger is 22.5W(Output:5W+2.5W+15W), EUT will select the coil antenna for discharge according to the placement of the charged product. For more detailed features description, please refer to the user's manual.

Antenna Type: Integral Antenna(embedded coil antenna)

The Model: TLL151391 is the same as the Model: WD-286C in hardware aspect. The difference in model number and trade name serves as marketing strategy.

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

N/A

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst-case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are Intertek Testing Services Shenzhen Ltd. Longhua Branch and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, ShenZhen. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

3.0 System Test Configuration

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The EUT was powered by AC 120V/60Hz from adapter during the test. The following EUT mode configurations have been performed. The EUT equipped with three coil antennas, measurements have considered all coils separately and simultaneously. And all power input voltages (DC 9V=3A, 12V=2.5A, 15V=2A) and all rated output powers have been tested, but only the worst-case testing data were recorded in this report.

Pertest mode	Description
Mode 1	Standby mode
Mode 2	Mobile phone is charging at 1% battery power (Only Magsafe charger in charging)
Mode 3	Mobile phone is charging at 50% battery power (Only Magsafe charger in charging)
Mode 4	Mobile phone is charging at 99% battery power (Only Magsafe charger in charging)
Mode 5	Apple Watch is charging at 1% battery power (Only Watch charger in charging)
Mode 6	Apple Watch is charging at 50% battery power (Only Watch charger in charging)
Mode 7	Apple Watch is charging at 99% battery power (Only Watch charger in charging)
Mode 8	AirPods is charging at 1% battery power (Only AirPods charger in charging)
Mode 9	AirPods is charging at 50% battery power (Only AirPods charger in charging)
Mode 10	AirPods is charging at 99% battery power (Only AirPods charger in charging)
Mode 11	All Sides are charging at 1% battery power (Three chargers are charging)
Mode 12	All Sides are charging at 50% battery power (Three chargers are charging)
Mode 13	All Sides are charging at 99% battery power (Three chargers are charging)

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the bottom of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data report in Section 4.0.

The EUT and transmitting antenna was centered on the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the styrene turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

3.2 EUT Exercising Software N/A.

3.3 Special Accessories

There is no special accessories necessary for compliance of this product.

3.4 Equipment Modification

Any modifications installed previous to testing by SHENZHEN DNS INDUSTRIES CO., LTD. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

3.5 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Measurement Uncertainty	Uncertainty
Channel Bandwidth	±3.46%
Radiated emission (Up to 1GHz)	±4.8dB
AC Conducted emission	±3.6 dB
Temperature	±1°C
Humidity	±5%

3.6 Support Equipment List and Description

This product was tested in the following configuration:

Description	Manufacturer	Detail
Mobile Phone (Provided by Intertek)	Apple	iphone 13
Earphone (Provided by Intertek)	Apple	AirPods
Apple Watch (Provided by Applicant)	Apple	SERIES 3
USB cable (Provided by Applicant)	NIL	Unshielded, Length 185cm
USB Power Adapter (Provided by Intertek)	N/A	Model No: W0920U-1U05F Input: 100-240VAC 50/60Hz 0.45A Max Output: 9V==3A, 12V==2.5A,15V==2A

4.0 Measurement Results

4.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

where FS = Field Strength in dB μ V/m
RA = Receiver Amplitude (including preamplifier) in dB μ V
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Example

Assume a receiver reading of 62.0dB μ V is obtained. The antenna factor of 7.4dB and cable factor of 1.6dB is added. The amplifier gain of 29dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0dB, and the resultant average factor was -10dB. The net field strength for comparison to the appropriate emission limit is 32dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 62.0dB μ V
AF = 7.4dB
CF = 1.6dB
AG = 29.0dB
PD = 0dB

AV = -10dB

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32\text{dB}\mu\text{V/m}$$

Level in μ V/m = Common Antilogarithm [(32dB μ V/m)/20] = 39.8 μ V/m

4.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

4.3 Radiated Spurious Emission

Worst Case Radiated Spurious Emission
at
45.156MHz

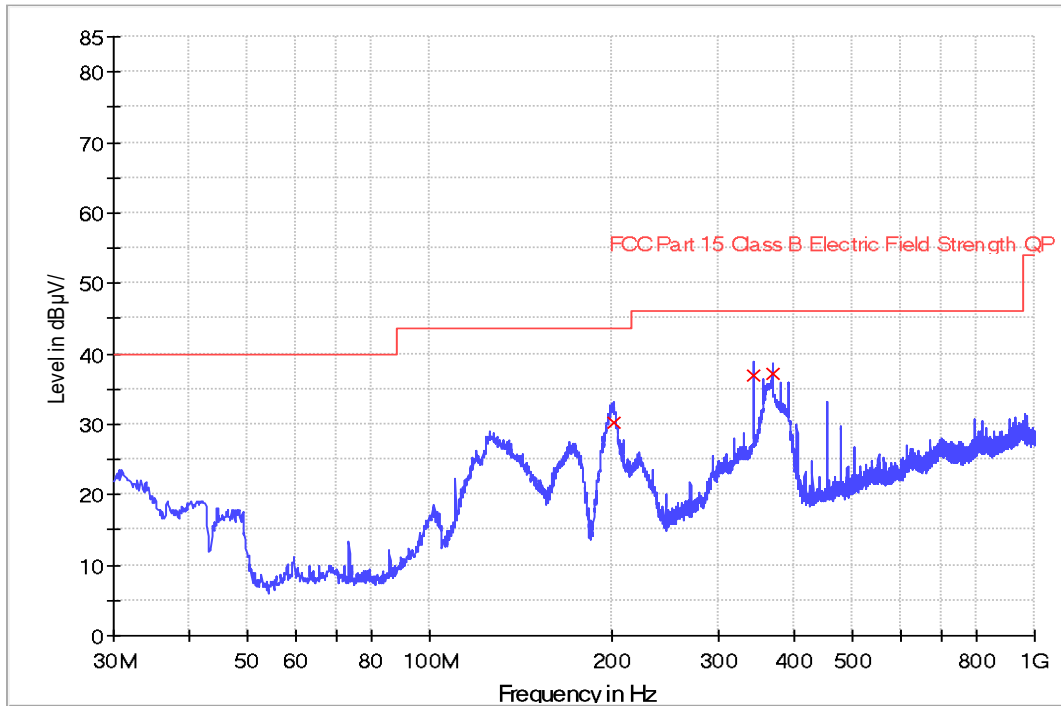
Judgement: Passed by 4.8dB margin

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

Radiated Emissions (30MHz – 1000MHz)

ANT Polarity: Horizontal

FCC Part 15



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth h (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
200.841250	30.2	1000.0	120.000	H	12.4	13.3	43.5
343.431250	37.0	1000.0	120.000	H	18.1	9.0	46.0
367.923750	37.2	1000.0	120.000	H	18.4	8.8	46.0

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

Applicant: SHENZHEN DNS INDUSTRIES CO., LTD.

Date of Test: 24 February 2023

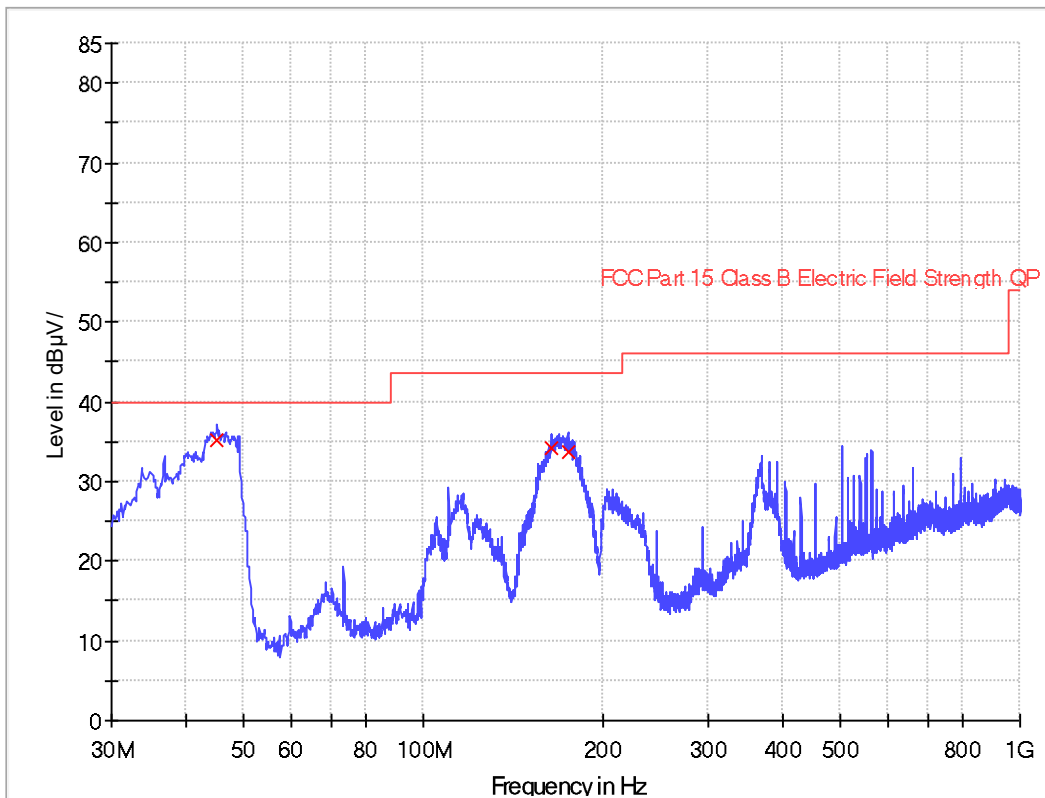
Model: WD-286C

Worst Case Operating Mode: Mode 11

Radiated Emissions (30MHz – 1000MHz)

ANT Polarity: Vertical

FCC Part 15



Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth h (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
45.156250	35.2	1000.0	120.000	V	10.7	4.8	40.0
164.102500	34.1	1000.0	120.000	V	11.9	9.4	43.5
174.530000	33.7	1000.0	120.000	V	11.8	9.8	43.5

Notes:

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

Fundamental & Spurious Emission Below 30MHz

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Distance Factor (-dB)	Calculated at 300m (dBµV/m)	Limit at 300m (dBµV/m)	Margin (dB)
Horizontal	0.1276	62.0	0.0	17.2	79.2	80	-0.8	25.5	-26.3
Horizontal	0.3265	50.3	0.0	17.0	67.3	80	-12.7	17.3	-30.0
Horizontal	0.3600	40.3	0.0	17.0	57.3	80	-22.7	16.5	-39.2

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Distance Factor (-dB)	Calculated at 30m (dBµV/m)	Limit at 30m (dBµV/m)	Margin (dB)
Horizontal	0.5123	38.1	0.0	17.0	55.1	40	15.1	33.4	-18.3
Horizontal	0.6532	37.4	0.0	16.8	54.2	40	14.2	31.3	-30.3
Horizontal	0.7198	23.6	0.0	16.7	40.3	40	0.3	30.5	-30.2

Notes:

1. The specified limits of frequency band 9~90 KHz, 110~490 KHz are in average and measurements are made with peak detectors. Quasi-Peak detector is used for other frequency band.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Loop antenna is used for the emission under 30MHz.
5. Horizontal and Vertical polarization were tested and only the worst case data is shown.

4.4 Conducted Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

4.5 Conducted Emission

Worst Case Conducted Configuration
at
24.15MHz

Judgement: Passed by 6.2dB margin

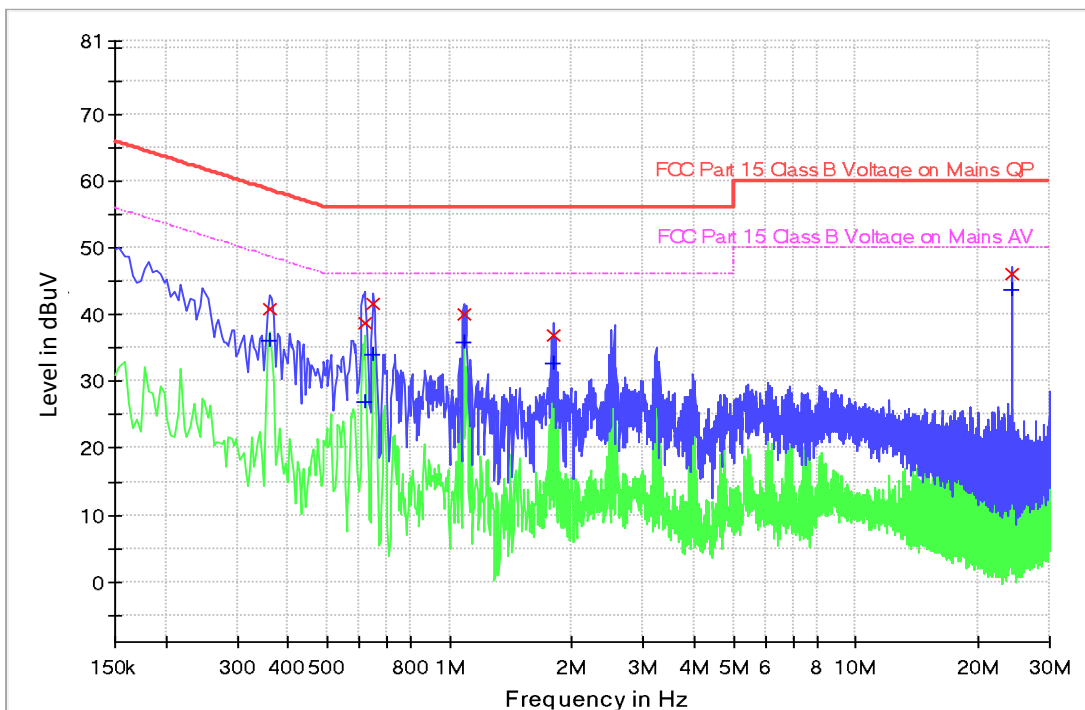
Applicant: SHENZHEN DNS INDUSTRIES CO., LTD.
Date of Test: 17 February 2023
Worst Case Operating Mode: Mode 11
Test Voltage: 120V/60Hz
Phase: Live

Model: WD-286C

Graphic / Data Table

Conducted Emissions Pursuant to FCC 15.207: Emissions Requirement

Conducted Emission Test FCC Part 15



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.362000	40.8	9.000	L1	9.6	17.9	58.7
0.618000	38.7	9.000	L1	9.6	17.3	56.0
0.650000	41.7	9.000	L1	9.6	14.3	56.0
1.082000	40.0	9.000	L1	9.7	16.0	56.0
1.802000	37.0	9.000	L1	9.7	19.0	56.0
24.150000	46.0	9.000	L1	10.7	14.0	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.362000	36.2	9.000	L1	9.6	12.5	48.7
0.618000	27.0	9.000	L1	9.6	19.0	46.0
0.650000	34.2	9.000	L1	9.6	11.8	46.0
1.082000	35.9	9.000	L1	9.7	10.1	46.0
1.802000	32.8	9.000	L1	9.7	13.2	46.0
24.150000	43.8	9.000	L1	10.7	6.2	50.0

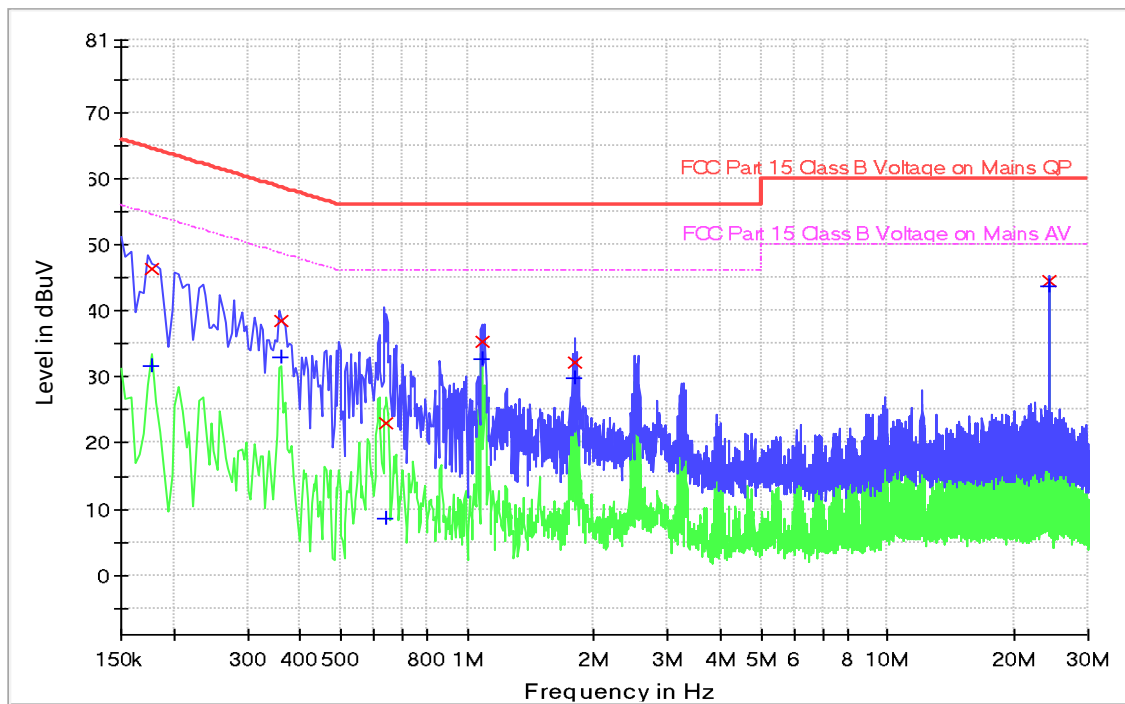
Applicant: SHENZHEN DNS INDUSTRIES CO., LTD.
Date of Test: 17 February 2023
Worst Case Operating Mode: Mode 11
Test Voltage: 120V/60Hz
Phase: Neutral

Model: WD-286C

Graphic / Data Table

Conducted Emissions Pursuant to FCC 15.207: Emissions Requirement

Conducted Emission Test FCC Part 15



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.178000	46.3	9.000	N	9.6	18.3	64.6
0.362000	38.5	9.000	N	9.6	20.2	58.7
0.642000	23.0	9.000	N	9.6	33.0	56.0
1.082000	35.3	9.000	N	9.6	20.7	56.0
1.802000	32.3	9.000	N	9.7	23.7	56.0
24.150000	44.6	9.000	N	10.7	15.4	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.178000	31.6	9.000	N	9.6	23.0	54.6
0.362000	33.1	9.000	N	9.6	15.6	48.7
0.642000	8.5	9.000	N	9.6	37.5	46.0
1.082000	32.8	9.000	N	9.6	13.2	46.0
1.802000	29.9	9.000	N	9.7	16.1	46.0
24.150000	43.8	9.000	N	10.7	6.2	50.0

5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

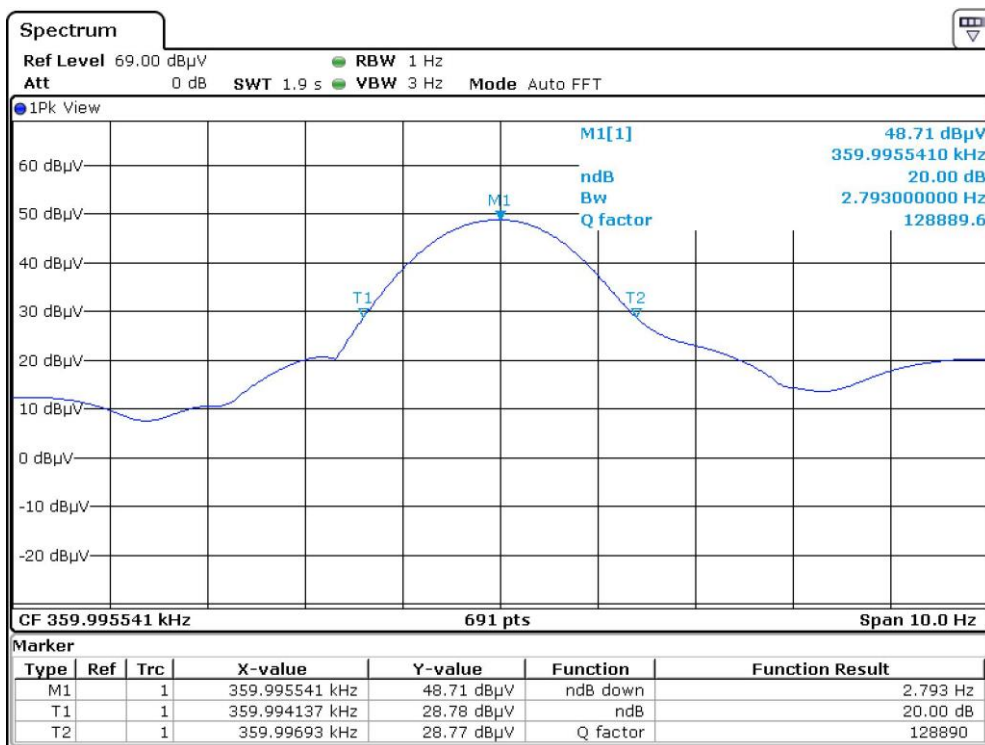
This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Miscellaneous Information

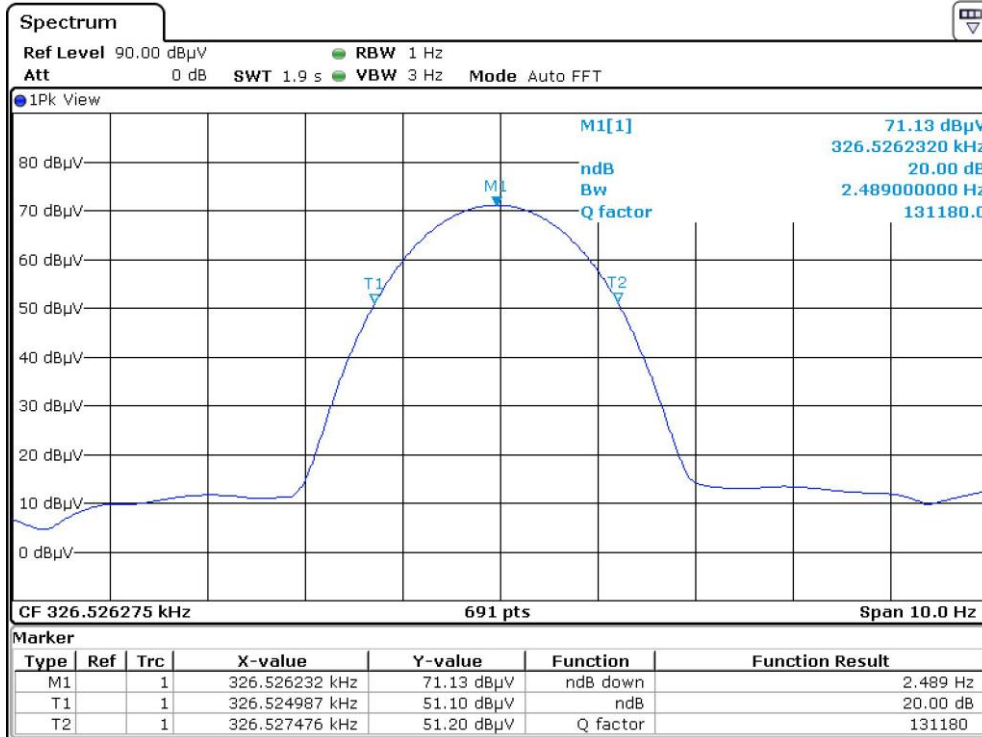
This miscellaneous information includes 20dB bandwidth and emission measuring procedure.

9.1 20dB bandwidth

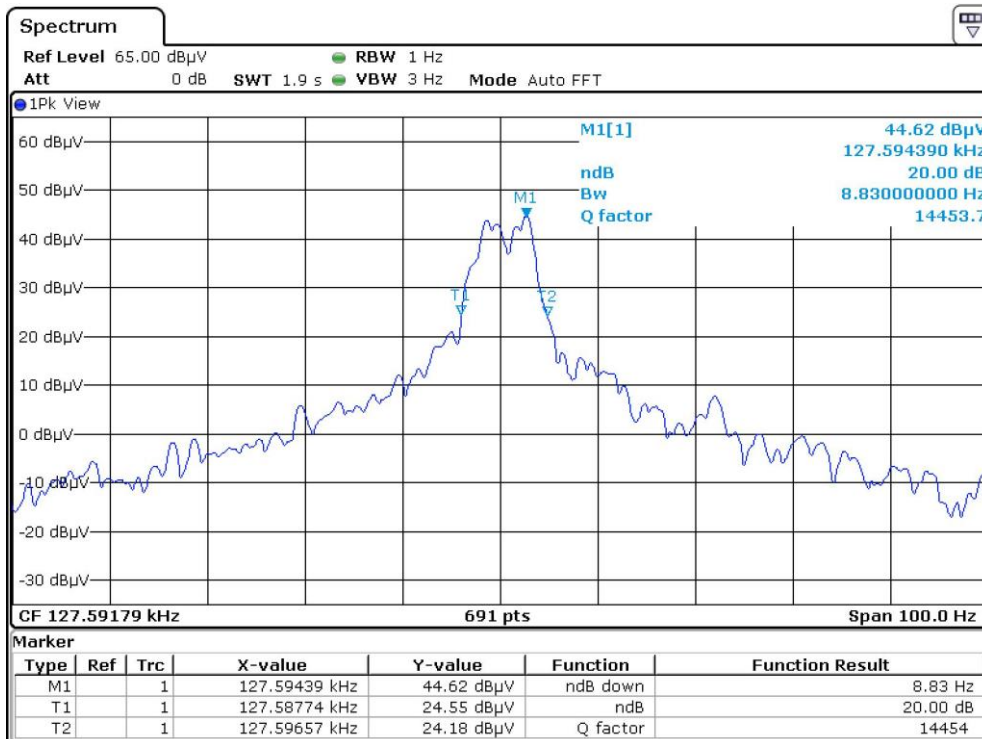
Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered. The test plots are reported as below.



Output 1 (Magsafe charger)



Output2 (Watch charger)



Output 3 (Airpods charger)

9.2 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.10 - 2013.

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter and approximately 0.8 meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Average detector is used for 9–90 KHz, 110–490 KHz and Quasi-Peak detector is used for other frequency band. The IF bandwidth used for measurement of radiated signal strength was 10 KHz for emission below 30 MHz and 120 KHz for emission from 30 MHz to 1000 MHz.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz up to the 1GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.10 - 2013.

The IF bandwidth used for measurement of radiated signal strength was 10kHz for emission below 30MHz and 120kHz for emission from 30MHz to 1000MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-13	BiConiLog Antenna	ETS	3142E	00217919	2021-08-04	2024-08-04
SZ185-04	EMI Receiver	R&S	ESR7	102466	2022-11-14	2023-11-14
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2021-05-18	2023-05-18
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	2022-12-19	2023-12-19
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	2022-12-19	2023-12-19
SZ188-05	Anechoic Chamber	ETS	FACT 3-2.0	CT001880-Q1391	2021-12-20	2024-12-12
SZ062-02	RF Cable	RADIALL	RG 213U	--	2022-11-15	2023-05-15
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	2022-11-15	2023-05-15
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	2022-11-15	2023-05-15
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2022-07-08	2023-07-08
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	2022-05-09	2023-05-09
SZ188-03	Shielding Room	ETS	RFD-100	4100	2022-12-20	2025-12-20
SZ062-16	RF Cable	HUBER+SUHNER	CBL2-BN-1m	110127-2231000	2022-07-18	2023-07-18

*****End of Report*****