



EN301489-1V1.9.2/EN301489-17V2.2.1 TEST REPORT

For

LigoWave LLC

Broadband Digital Transmission System

Model No. : NFT 2ac, NFT 2ac Sector

Prepared for : LigoWave LLC
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Prepared by : Shenzhen Alpha Product Testing Co., Ltd
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DECLARATION

Applicant : LigoWave LLC
 Manufacturer : LigoWave LLC
 Product : Broadband Digital Transmission System

(A) Model No. : NFT 2ac, NFT 2ac Sector

(C) Power supply : DC 48V adaptor with
 AC 230V/50Hz input.

ETSI EN 301 489-1 V1.9.2:

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 V2.2.1:

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. The measurement results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 302 502 V1.2.1 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Alpha Product Testing Co., Ltd..

Tested by (name + signature).....: Peter Kang
 Test Engineer

Approved by (name + signature).....: Simple Guan
 Project Manager

Date of issue.....: November 22, 2016



1. General Information

1.1. Description of Device (EUT)

EUT Name	: Broadband Digital Transmission System
Model No.	: NFT 2ac, NFT 2ac Sector
Diff	: Only Differ in model number
Trademark	: N/A
Power supply	: DC 48V From Adapter AC 230V/50Hz
Radio Technology	: IEEE 802.11 a,b,g, n/HT20,n/HT40/802.11ac 80MHz
Operation frequency	: 2412-2472MHz for IEEE 802.11 b, g,n/HT20 2422-2462MHz for IEEE 802.11n/HT40 5150-5350MHz, 5470MHz-5725MHz for IEEE 802.11 a, n/HT20/n HT40/ac 80MHz. 5.725-5.825GHz for IEEE 802.11 a.n/HT20
Modulation	: IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11ac: OFDM (256QAM) IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
Intend use environment	Residential, commercial and light industrial environment
Antenna Type	: 2*Omni antenna : 2 dBi
Intend use environment	: Residential, commercial and light industrial environment
Applicant	: LigoWave LLC
Address	: 138 Mountain Brook Dr Canton, GA 30115 United States
manufacture	: LigoWave LLC
Address	: 138 Mountain Brook Dr Canton, GA 30115 United States

1.2. Accessories of device (EUT)

Description	:	Adapter
Manufacturer	:	N/A
Model No.	:	GRT-POE20-480050A

Description	:	Adapter
Manufacturer	:	N/A
Model No.	:	G0720-480-050

1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd.
Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road,
Bao'an, Shenzhen, China

August 11, 2014 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

2. Summary of test

2.1. Test Standard description:

ETSI EN 301 489-1 V1.9.2: 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 V2.2.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems

EN55022:2010: Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.

EN55024:2010 : Information technology equipment- Immunity characteristics- Limits and methods of measurement.

2.2. Summary of test result

NO	TEST PARAMETER	APPLICATION	RESULTS
EMC emission			
1	Radiated emission	Enclosure of ancillary equipment and non wireless function	PASS
2	Conducted emission	DC power input/output port	N/A
3	Conducted emission	AC mains input/output port	PASS
4	Harmonic Current Emissions	AC mains input port	N/A
5	Voltage Fluctuation & Flicker	AC mains input port	PASS
6	Conducted emission	Telecommunication port	PASS
Immunity			
7	RF electromagnetic field	Enclosure	PASS
8	Electrostatic Discharge	Enclosure	PASS
9	Fast transients common mode	Signal,telecommunication and control ports, and AC power ports	PASS
10	RF Common mode	Signal,telecommunication and control ports, and AC power ports	PASS
11	Transients and Surges	DC power input ports for vehicular use	N/A
12	Voltage dips and interruptions	AC mains power input ports	PASS
13	Surges ,line to line and line to ground	AC mains power input ports, telecommunication ports	PASS

Note: N/A means this test item is not applicable for this device.

Note: This device also belong to information technology equipment, and most of EN55022 and EN55024's test intems are same with ETSI EN301 489's.so most of EN55022 and EN55024's tests were performed together with EN301 489's test.

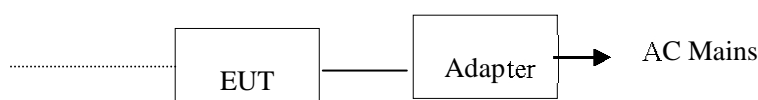
Note: All test were performed on EUT with different antennas, and only worst data listed in this report.

2.3. Assistant equipment used for test

Description	:	N/A
Manufacturer	:	N/A
Model No.	:	N/A

2.4. Block Diagram and Mode of EMC test

WIFI Mode



Wireless connection

EUT transmit data with PC through EUT and wireless router

.Remark: All tests were performed with two adapters and only worst test data listed in this report.

2.5. Immunity performance assessment criteria

General performance criteria

During test	After test	Criteria
Operate as intended; Degradation of performance (see note 1); No loss of function.	Operate as intended; No degradation of performance (see note 2); No loss of function.	A
Loss of function (one or more).	Operate as intended; No degradation of performance (see note 2); Functions self-recoverable.	B
Loss of function (one or more).	Operate as intended; No degradation of performance (see note 2); Functions recoverable by the operator.	C
<p>NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the permissible degradation of performance is not specified by the manufacturer, then this may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p> <p>NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible degradation of performance is not specified by the manufacturer, then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p>		

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions and voltage dips exceeding a certain period of time.

2.6. Test Conditions

All test were performed under the following environmental conditions

Temperature range	:	21-25°C
Humidity range	:	40-75%
Pressure range	:	86-106kPa
Power supply	:	DC 48V From Adapter AC 230V/50Hz

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

No.	Item	MU	Remark
1	Uncertainty for Conducted Emission Test	2.50dB	
2	Uncertainty for Radiation Emissions	3.04 dB	Polarize: V
		3.02 dB	Polarize: H

2.8. Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last cal. Due To	Cal. Interval
Test Receiver	Rohde&Schwarz	ESCI	101165	2017.01.16	1 Year
Amplifier	Schwarzbeck	BBV9743	9743-019	2017.01.16	1 Year
Bilog Antenna	Schwarzbeck	VULB 9168	9168-438	2015.01.21	2 Year
Spectrum Analyzer	Agilent	E4407B	MY49510055	2017.01.16	1 Year
Horn Antenna	Schwarzbeck	BBHA 9120 D	BBHA 9120 D(1201)	2017.01.20	2 Year
Amplifier	Quietek	AP-180C	CHM-0602012	2017.01.16	1 Year
Test Receiver	Rohde & Schwarz	ESCI	101165	2017.01.16	1 Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2017.01.16	1 Year
L.I.S.N.#2	ROHDE&SCHW ARZ	ENV216	101043	2017.01.16	1 Year
Pulse Limiter	Schwarzbeck	9516F	9618	2017.01.16	1 Year
Harmonics Flicker Analyser	Voltech	PM6000	200006700495	2017.01.16	1 Year
ESD Tester	HAEFLY	PESD1610	H310546	2017.01.18	1 Year
Signal Generator	Marconi	2031B	11606/058	2017.01.16	1 Year
Amplifier	A&R	100W/1000M 1	17028	NCR	NCR
Isotropic Field Monitor	A&R	FM7004	0325983	NCR	NCR
Isotropic Field Probe	A&R	FL7006	0325736	2017.01.16	1 Year
Laser Probe Interface	A&R	FL7000	325430	NCR	NCR
Power Meter	Anritsu	ML2487A	6k00003262	2017.01.16	1 Year
Power Sensor	Anritsu	MA2491A	33005	2017.01.16	1 Year
Log-periodic Antenna	A&R	AT1080	16512	NCR	NCR
CONDUCTED IMMUNITY TEST SYSTEM (RF-Generator)	Frankonia	CIT-10/75	12681247/2013	2017.01.16	1 Year
Fixed Coaxial Attenuator (6dB Attenuation)	CD	ATT-0675	120540086	2017.01.16	1 Year

Coupling-Decoupling Network (CDN)	CD	CDN M2/M3	2302	2017.01.16	1 Year
Electromagnetic Injection Clamp (EMC-Clamp)	CD	EM-Clamp	0513A031201	2017.01.16	1 Year
Main Interference Simulator	3ctest	VDG-1105G	EC0171002	2017.01.16	1 Year
Burst Tester	3ctest	EFT-4001G	EC0461015	2017.01.16	1 Year
Capacitive Coupling	3ctest	EFTC	EC0441049	2017.01.16	1 Year
Surge CDN	3ctest	SGN-5010G	EC5591004	2017.01.16	1 Year
Surge Generator	3ctest	SG-5006G	EC5581006	2017.01.16	1 Year
Base station	Agilent	E4438C	US44271917	2017.01.16	1 Year
Universal Radio Communication Tester	ROHDE&SCHWARZ	CMU200	116785	2017.01.16	1 Year
Audio analyze	ROHDE&SCHWARZ	UPV	113258	2017.01.16	1 Year
Signal Generator	Agilent	N5182A	MY49060042	2017.01.16	1 Year

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